Railway Age

Vol. 64 March 20, 1918 No. 11b

Canadians Following Up an Advance

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Published every Friday and daily eight times in June by the

Simmons-Boardman Publishing Company, Transportation Building, Chicago

EDWARD A. SIMMONS, *Pres.* L. B. SHERMAN, *Vice-Pres.* HENRY LEE, *Vice-Pres. & Treas.* M. H. WIUM, *Secretary.*

NEW YORK: Woolworth Building. **CLEVELAND:** Citizens Building. **WASHINGTON:** Home Life Building

PUBLISHED DAILY FOR FOUR DAYS, MARCH 19 TO 22, INCLUSIVE, BY Simmons-Boardman Publishing Co., Transportation Bldg., Chicago, Ill., on the occasion of the annual convention of the American Railway Engineering Association and the stated meeting of the Railway Signal Association.

Application made at the Post Office at Chicago, Ill., for entry as mail matter of the second class.

Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free: United States and Mexico, $5.00; Canada, $6.00; Foreign Countries (excepting daily editions), $8.00; single copies, 15 cents each.

WE GUARANTEE, that of this issue, 7,634 copies were printed; that of these 7,634 copies, 6,375 were mailed or delivered by messenger to regular paid subscribers; 700 were distributed among members and guests of the American Railway Engineering Association and at the Coliseum; 325 copies were provided for office use to fill future orders; 130 copies were mailed to advertisers, and 104 copies were mailed as samples.

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EDITORIAL

DAILY EDITION

Conservation and the War

What virtue is there in the conservation of natural resources if human rights are sacrificed? The only answer to this is that the conduct of the War for Freedom justifies a dissipation of the natural wealth of the world at a rate not previously dreamed of, and according to methods that would be considered disgracefully wasteful in sober times of peace. However much the demands of the moment may positively require an almost ruthless waste, such as the destruction of the beautiful roadside elms of France for trench timbers, the rights of posterity demand the practice of conservation wherever it does not interfere with the adequate supply of war needs. Just as the lavish expenditure of money on the part of the government demands a corresponding frugality on the part of the people, so it devolves upon railroad men to practice conservation even more than in the past. One unfortunate effect of the present emergency has been a tendency to discontinue the practice of treating timbers for railway structures, and to use inferior grades of lumber. Cheap or makeshift measures may be necessary in some places and even desirable for temporary arrangements, but the fallacy of such practices where avoidable will be demonstrated all too quickly in a far shorter life than could be expected of standard construction.

Promoting Safety in Passenger Stations

Prior to the building of the Grand Central terminal in New York, the New York Central conducted experiments extending over a period of several years before deciding on the nature of the flooring and the grade of ramps to be used in the station building. The studies included experiments with 15 or 20 different flooring materials and nearly as many different inclinations of ramps. Before and since that time individual roads have carried on similar experiments previous to the construction of passenger stations. The fact that it was considered necessary to make these experiments emphasizes the importance of the work of the Committee on Buildings and the value of its recommendations on provisions to insure safe walking in and about passenger stations. While it does not follow that these studies and recommendations will entirely relieve individual roads from carrying on their own investigations when planning new passenger facilities, it does follow that their work is simplified. The knowledge of what others have done and the character of the results obtained presented in the concise manner of this report offer a foundation on which a road may build its own conclusions. Another point to be considered in providing for the safety of the public in passenger stations is the wide difference in the characteristics of the suburbanite as contrasted with the infrequent traveler. Facilities which will insure safety and the prompt movement of experienced travelers will not in all cases answer for the inexperienced. This phase of the question has been fully considered by the Committee on Buildings. The suggestions made in the report are of a constructive nature and should prove to be of value to railway men in working out the details of station design.

Importance of a Water Service Department

The committee on water service is to be commended for calling attention to the importance of an adequate organization to supervise water service problems, although it could well have placed more emphasis on this subject. It is true that on most roads water service is handled as an adjunct to some other department or branch of the service without any direct concentration of responsibility. The fact that this is the common practice does not, however, demonstrate its correctness. Rather, the improvements which have been effected on the few roads which have concentrated responsibility for the construction, maintenance and operation of water stations in one distinct department indicates that this common practice is wrong. The importance of a proper quality of water is being realized now more than at any time in recent years because of the necessity of securing the maximum service from each locomotive. This is leading to a realization of the importance of studying the quality of the water delivered at each individual station, which in itself is the work of a specialist. The increased demand for water resulting from the heavy traffic is also necessitating the reconstruction of many stations to provide the requisite capacity. This increased consumption is also requiring pumping for longer intervals and increasing the costs of operation, which in turn suggests larger and more modern pumping equipment. This and the other phases of the water service problems are of sufficient importance to justify the utilization of specialists in water service matters rather than leaving them to be solved by other men whose primary responsibilities are in other directions.

The Convention Attendance

The preparation of the arrangements for the present convention of the American Railway Engineering Association was facilitated materially by a common feeling among the officers and directors in favor of a meeting this year, notwithstanding the postponement of several other railway conventions. In fact, some of those in charge were especially impressed with the idea that the convention could be made of particular value this year, and that with a proper arrangement of the program many railway men would make a special effort to attend because of the opportunity to discuss the questions of the hour. The correctness of this position is borne out by the large attendance yesterday. The registration of members totaled 293 or 4 more than the number recorded for the first day last year. This is in addition to 75 guests who registered. While this is a smaller number than was registered two years ago, the enormous burden placed on all railway officers under prevailing conditions makes it

difficult for many to leave their work and the attendance recorded evidences the high value which the members place on the convention now in progress.

Government Interference With Railways

PRESIDENT SULLIVAN'S ABLE ADDRESS to the Railway Engineering Association yesterday calls attention forcibly to the danger that when governments begin to interfere with the development and management of railroads, their interference will become excessive, unwise and harmful.

In Mr. Sullivan's own country, Canada, the government began some years ago to stimulate railroad construction by a varied policy of subsidies and guarantees. If kept within reasonable limits this policy might have been beneficial. But the government, for various reasons, carried it to great excess. Mr. Sullivan did not mention the fact, but it is well-known that one of the main reasons why the policy was carried to such excess was that the political parties of Canada began to seek public favor by competing with each other in subsidizing railroad development. In consequence, the railroads became greatly over-built, and the country has on its hands a large mileage which has and will have for years only a very small business; which is unable to earn a return upon the investment on it; and which has become a heavy burden upon the Canadian taxpayers.

As Mr. Sullivan showed, the national and state governments in the United States have gone to the opposite extreme. Instead of over-stimulating railroad development, they have for years so held down the rates and restricted the net earnings of the companies, that the expansion of facilities has been almost stopped. In consequence, in the midst of a great war, the government has considered it necessary to take control of the operation of the railways in order to save them and the country financially and to promote greater development and more efficient operation of transportation facilities.

The presentation of these incontrovertible facts inevitably suggests some most important questions regarding the future of the railways of Canada and of the United States, both during the war and after its conclusion. The government of Canada has thus far left the operation of that country's railways in the hands of their usual managers. The government of the United States has taken control of operation in this country. In both countries there is an active propaganda for government ownership.

It was necessary for the government of this country to come to the rescue of the railways if they were to be saved from financial disaster. Whether it was desirable for it to assume control of their management is very doubtful. Whether it is desirable for it to make radical changes in the organizations and operating methods is still more doubtful. Certainly there is nothing in the past railway experience of either Canada or the United States to lead anybody to believe that the substitution of government methods for private initiative and enterprise will improve railway management.

Whatever the effects of government control may be during the war, when both public men and railway men are influenced by patriotic considerations of the most potent character, there can be little doubt in the mind of any well-informed man as to what would be the results of government management of the railways of Canada or the United States in time of peace. Government subsidies have disastrously over-stimulated railroad development in Canada, and to the extent that government ownership has been tried in that country it has resulted in inefficiency and heavy losses to the taxpayers. Government regulation has stopped railroad development in the United States. These facts constitute a record of unwisdom on the part of the governments of these countries in dealing with railways which argues powerfully in favor of less government interference and greater room for the exercise of private initiative and enterprise on railways.

No step could more fatally handicap the commerce and industry of Canada and the United States after the war or do more harm to all classes of their people, than the adoption of government ownership of their railways.

The A. R. E. A. Studies Labor

IN SPITE OF THE FACT THAT over one-half of the total expenditures of the engineering and maintenance of way departments goes for labor, the American Railway Engineering Association failed to give any concerted attention to this subject until last year. While the failure to realize the importance of this subject is to be regretted, the Board of Direction is to be commended for undertaking the consideration of this subject a year ago through the formation of the committee on Economics of Railway Labor. This committee has before it a wider field for investigation and study than any other committee of the Association and the results of its investigation, if intelligently made, will be of greater value to the roads. It is not surprising, therefore, that the committee covered only a small part of the field assigned to it during the first year of its existence, for its time was necessarily spent in large measure in organizing for work in future years. Important as the hiring and the housing and feeding of men are, which the committee reported on yesterday, these are only two of a large number of problems coming within the province of this Association for study.

The labor problem is one of many ramifications. The effect of seasonal employment, the determination of the best methods of performing work and thereby increasing the output of the men, means of stimulating effort by special rewards, etc., the relative adaptability of various classes of labor to the laying of rail, ballasting, section work, and other problems and the training of men and particularly of foremen, are only a few of the many important problems which this committee should undertake to study at the earliest opportunity. With the overshadowing importance which the labor problem has now assumed in engineering and maintenance of way work, it would not be surprising if the Board of Direction should find it advisable to organize one or more additional committees and to subdivide the work now confronting the committee on Economics of Railway Labor, in order that these problems may receive adequate consideration in the immediate future. The American Railway Engineering Association can perform no greater service for the railways of the United States and Canada at present than to undertake aggressively the study of the problems of labor as reflected in railway work.

The report of the committee will be presented today, and should call forth a most interesting and instructive discussion.

Somewhere in America

"What time does the next train leave?"

Agent: "Don't know; haven't heard from Mr. McAdoo this week."

Track Committee Meeting

There will be a meeting of the Track committee in the Green Room of the Congress Hotel today at nine o'clock.

Veteran Railway Man Dies

Richard H. L'Hommidieu, formerly assistant to the vice-president of operation of the Michigan Central, died at Detroit, Mich., on March 18, at the age of 68 years.

C. C. Higgins Goes With Frisco

C. C. Higgins, consulting engineer with J. W. Kendrick, Chicago, has been appointed assistant to the vice-president of the St. Louis-San Francisco, with office at St. Louis, Mo., effective March 15.

The Labor Committee Meets

Several members of the committee on Economics of Railway Labor gathered at luncheon at the Chicago Engineers' Club to discuss the presentation of their report before the convention today. Owing to the rapidity with which conditions in the labor market have changed since the completion of the report of the committee in December, this meeting was called for the purpose of considering certain revisions in the report as printed before its presentation to the convention.

Today's Convention Program

The reports scheduled for presentation at the convention today are as follows:

Electricity.

Yards and Terminals—War Emergency Yard Improvements.

Economics of Railway Labor—Illustrated Use of Labor-Saving Devices.

Ballast—Illustrated Use of Mechanical Tampers.

Economics of Railway Operation.

Uniform General Contract Forms.

Roadway.

While it is planned to present seven reports, it is expected that most of the day will be devoted to the consideration of the report on Economics of Railway Labor, including descriptions of labor-saving devices, which will be illustrated by slides. It is expected this report will create active discussion.

A Correction for Mr. Talbot

In yesterday morning's issue we stated that A. N. Talbot, professor of civil engineering at the University of Illinois, had been appointed chairman of the newly-created construction division of the War department to carry on the immense building program of the government. This information was based upon a statement appearing in the daily papers and credited to the War department. Like the report of Mark Twain's death, which he stated was "greatly exaggerated," we find that there was some confusion relative to the position which Professor Talbot had accepted. The fact is that the newly-created construction division of the War department is simply a new title for the cantonment division. Coincident with this change in title, the duties of the construction division have been enlarged somewhat. In making preparations for the immense building program of the construction division the War department called in a temporary advisory committee, of which Professor Talbot was chairman, for the purpose of considering and advising on the methods to be pursued in the execution of this work. Professor Talbot was advised of his appointment while in New York last Tuesday and went to Washington immediately, where he conferred with the other members of the committee, completing the report in time to return to his home in Urbana, Ill., Saturday evening. We are glad to make this correction in order that the friends of Professor Talbot may be correctly informed regarding this appointment.

J. B. Jenkins Enters Active Military Service

J. B. Jenkins, valuation engineer of the Baltimore & Ohio and for several years chairman of the Track Committee, received a commission as major in the army several months ago and has recently been called into active service. This accounts for his absence from the convention for the first time in several years.

B. & B. Committee Meeting

The executive committee and interested members of the American Railway Bridge and Building Association will meet at the Congress Hotel at four o'clock this afternoon to discuss plans for the convention of this association, which will be held next October. A number of important questions are to be considered, including a possible change in the location for the meeting selected last fall.

Indianapolis Track Elevation to Be Completed

(From Our Washington Correspondent)

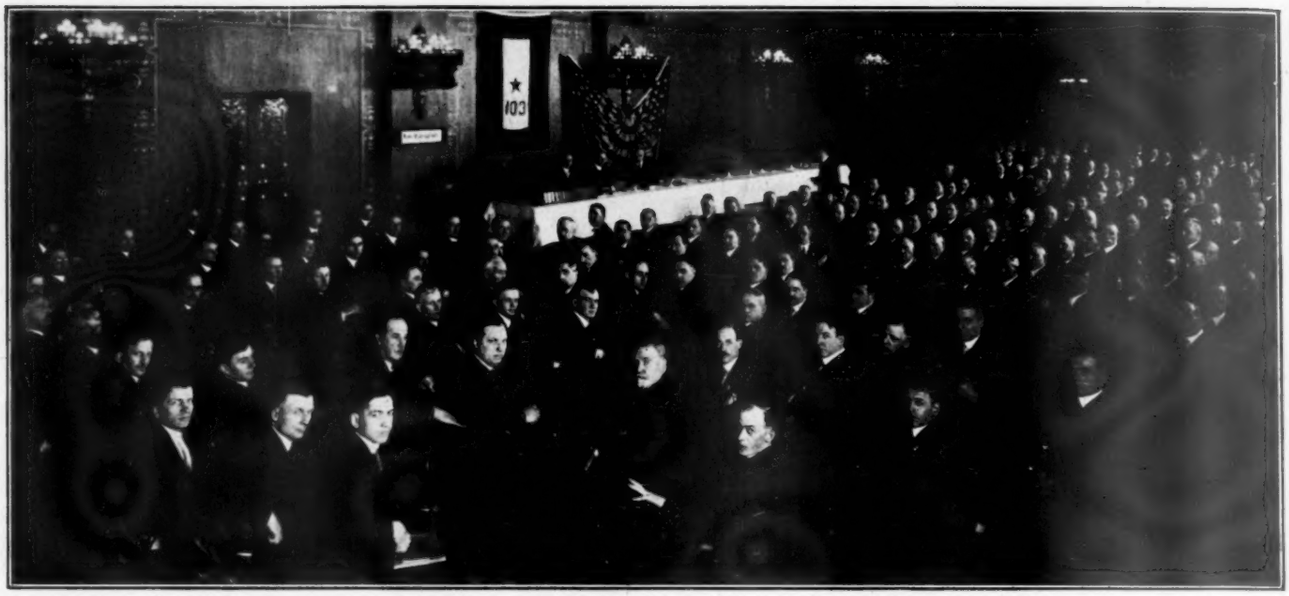
Director-General McAdoo yesterday ordered track elevation work at Indianapolis to be continued to completion, with some modifications of the original plans. Over $7,000,000 have already been expended and about $6,000,000 more will be required. The decision is based on a report made by Commissioner Harlan of the Interstate Commerce Commission.

Wood Preservers Committee Meeting

Approximately 10 members of the executive committee of the American Wood Preservers' Association took dinner together in the Delft room of the Hotel Sherman last night and discussed a number of problems confronting the association. The meeting adjourned at 8 o'clock to permit the members to attend the meeting of the Western Society of Engineers. The committee will meet at lunch tomorrow to complete the work before it.

Attendance at N. R. A. A. Exhibit

The National Railway Appliances Association exhibit at the Coliseum has been very well attended during the first two days. Visitors attending seem to be particularly interested in the exhibit of labor-saving devices. On Monday, March 18, there was a total of 2,442 visitors. This figure does not include exhibitors and their representatives. At 5:30 last night there was a total of 3,669 visitors and the total registration of exhibitors and representatives at that time was 921, making a total of 4,590 for yesterday at that hour. The total number of exhibitors and representatives for last year was 1,028. The registration of roadmasters for Monday was 38 and for yesterday 91, the secretary stating this is approximately one-third better attendance than last year. The Bridge and Building Association had a total registration of 67 yesterday.



The American Railway Engineering Association Convention in Session

American Railway Engineering Association Proceedings

A Report of the Tuesday Sessions, Including the President's Address and Several Committee Reports and Discussions

THE NINETEENTH ANNUAL CONVENTION of the American Railway Engineering Association was called to order in the Florentine room of the Congress Hotel at 9:45 yesterday morning by President John G. Sullivan, chief engineer of the Canadian Pacific, Lines West. The convention room was unusually well filled at the time the meeting was called to order, and many other members and guests registered during the day. In order to give more time for the consideration of the reports, the reading of the minutes of the last meeting was dispensed with and the convention passed immediately to the president's address.

Address of President John G. Sullivan

Since we last met in this Auditorium, events have occurred in this country of such world wide importance that ordinary problems, business and occupations are more or less disorganized. It is therefore gratifying to see such a large assembly at this, the 19th annual meeting of your Association. It is an evidence that you have come here determined to do what you can to help solve the all important problem of winning the war. What our members are doing in the service of their Country is indicated by this Service Flag you see before you; and what your committees have done during the year you will better realize when you have the reports they are to present.

One of the most serious problems that the railroads on this continent will have to meet in the next year or so is the one of Labor. Committee No. 22, studying the question of Economics of Railway Labor, has prepared for a very full discussion of this serious problem and it is hoped that all members of the Association will be present at this discussion, beginning Wednesday morning.

On behalf of the Association your President invited the director general of railways—the Hon. W. G. McAdoo—to send a representative to take part in this discussion. The Hon. Mr. McAdoo replied in part as follows:

"While I appreciate the suggestion and recognize the value of a discussion of this character, my organization has not been expanded to a point where, at this time, anyone can be spared. I hope you will have a very successful meeting."

Your President also sent a similar invitation to the Hon. W. B. Wilson, secretary of labor, to which we have received no written reply. If, however, there are any employees from the Department of Labor at the meeting, we will be very glad to hear from them and have them enter into the discussion.

The Railway Situation and Politics

A study of the railway situation in the United States for the past 30 years indicates that the boom year for construction was in 1887, when nearly 13,000 miles of new railway was constructed. In the years 1894 to 1897 this rate of construction dropped to less than 2,000 miles per year. From 1900 to 1907 the average was about 5,000 miles per year. It gradually decreased from that time until 1917, when the construction was less than 1,000 miles. In Canada, the rate of construction from 1901 to

1904 averaged about 500 miles. This rate gradually increased until 1913 when it reached a maximum of 3,000 miles. It has dropped from that time until the present and the track mileage last year was actually decreased on account of some lines being taken up; the steel being shipped to France.

During the past ten years we have not suffered in Canada through adverse railway legislation or regulation, but on the contrary the people and the country are suffering from the encouragement of legislation to unnatural rapid development, resulting in the expenditure of enormous sums of money and the building of unnecessary railways; railways that cannot for the present, or any time in the near future, pay operating expenses, to say nothing of paying interest on the investment.

The annual report of the Department of Railways and Canals to March 31, 1916 shows, for the nine years beginning with 1907 to 1916, that the Government had expended over $22,000,000.00 per year on government railway construction. Their working expenses during this same period have exceeded their revenue by $2,000,000.00 and at the present time the working expenses are considerably over $1,000,000.0 per year greater than the revenue. In addition to this expediture made directly by the Government, the Federal and Provincial governments have guaranteed the interest on bonds up to a sum between three-quarters of a billion and one billion dollars. During this same period they have also granted large sums of money in the way of subsidies to privately owned railways; some provincial Governments going so far as to get rich contractors to organize railway companies (tempted no doubt by the bait of profits on construction) to build railways where the present railway companies of Canada could not be tempted to build, even though the bonds might be guaranteed by the Government. Would it therefore be any great surprise, if assuming this great world war was not being carried on, public opinion regarding railways as represented by legislation would not show signs of modification in Canada and if we should hear threats of anti-railway legislation of the most radical character? Nevertheless, as already explained, the railway troubles of Canada are not due any more to the efforts of railway promoters and builders than to an uninformed and over-sanguine public opinion. Is it not logical to assume that similar boom conditions existed in the United States prior to the year 1887? Then came the Interstate Commerce Commission; followed by numerous State Commissions. A study of the Interstate Commerce Commission reports show that, for the past 30 years, probably only for two or three years did the dividend paid on the stocks of the companies amount to over 5 per cent on the total stock, while for 6 or 7 years the interest was less than 2 per cent and that never in that time has over 68 per cent of the stock paid any dividend; while there were years when less than 50 per cent of the railway stock of the United States paid any dividend. These reports also show that the interest on the bonded indebtedness never amounted to 5 per cent and there was always a considerable percentage of bonds which paid no interest. These reports also show that by either comparing the tons of freight handled, or more properly, the tons of freight carried one mile, the business of the country has increased nearly twice as fast as the capital invested. These reports also show that the number of cars and locomotives in service has not kept pace with the business. We must, of course, take into account in considering this factor, the increased weight of the individual locomotives and the increased capacity of the cars. These reports also show that the miles of track have not increased anything like the rate of increase in business. More significant is the rate of increase of sidings and yards. The reports do not separate passing sidings from terminal yards and other business yards, but when one considers the necessarily large increase in the mileage of passing sidings required for an increase in business it is almost self-evident that the increase in terminals and business tracks has not kept pace with the business. It may seem strange to you that I should bring up this subject at this time when the "house is on fire" and when the Government has stepped in and has asked all hands to lend a hand to put out the fire, making no reference to what has caused the trouble, it only being intimated by a very few discredited radicals that the railwaymen were to blame for the setting of the fire. It is generally conceded that lack of capital has been the cause of the difficulty and that capital has been frightened away by anti-railway legislation and regulation. A great many are apt to blame our Governments for this condition, when as a matter of fact, it is you and I, citizens and voters of this country, (the responsible parties) who are actually to blame and it is for this reason that I have brought up the subject and wish to discuss politics. I wish to emphasize that we Engineers as a body are more to blame than any other class of men, for the reason that we take less interest in politics than any other body.

John G. Sullivan, President

Another reason why I wish to discuss this subject somewhat further is the fact that if we do not win this war, nothing much matters. If however, as we all hope, Democracy will come out victorious, our responsibilities will be the greater and we must meet those responsibilities with courage and do our duty as men.

To make my meaning a little more clear, I will ask you to consider how you railroad men would think the railways of the country would be managed if all the offices were filled by office seekers rather than by men chosen on account of their ability and fitness to fill the office. I venture to say that there are very few chief engineers in this room who did not protest at their first promotion to take charge of a location party or a party on construction. I further venture to say, that there is not a locating engineer in this room who at some time did not have the experience of having a rodman or stakeman mistaken for the chief of the party, and I will go further and say that if his party had been a political organization the chances are ten to one that the rodman or stakeman would have been in charge of the party. Only the other day I asked a prominent citizen of a town in Western Canada, how it happened that a certain party had been elected a Mem-

ber of Parliament. His reply was, "The other man had a larger acquaintance and was better known." Every railroadman should realize that his own welfare depends on the welfare of the country and the company for whom he is working, no matter whether he is a section laborer, chief engineer or president, and he should take the same interest in selecting representatives to the legislature who will make laws controlling the actions of the railroads, as he would in selecting directors of a railroad if he was a stockholder.

In conclusion, let me impress on you the necessity of taking an active interest in politics, not alone in going to the polls and voting for the least objectionable office seeker, but by taking an active interest in choosing the candidates and, if necessary, sacrificing time and other interests to become officers if called upon to do so, remembering that when this war is over, the responsibility placed on the voters of democracies will be greatly increased and especially so in the United States where you have gone one step further than democratic Canada and other less radical democracies, by the fact that you not only elect your legislative bodies, but you also elect your judiciary and executive officers by popular vote. And realize further, that you need honest, intelligent and capable representatives more in times of prosperity than you do in times of adversity. In the meanwhile, let us join hands with the Government, put our shoulders to the wheel and do all in our power to win this war for freedom and democracy. Then after the victory, let us not shirk our duty, but assume the responsibility of self government, making sacrifices where necessary and thereby making democracy a real success.

Report of the Secretary

The following report on the general affairs of the Association for the past year is respectfully submitted:

Number of members at last annual report		1,370
Admitted during the year	80	
Deaths	8	
Resigned	29	
Dropped	26	
	63	63
Net gain for the year		17
Total membership		1,387

One hundred and three members of the Association are in the military service of the United States and Great Britain or with the Canadian expeditionary forces in France. Captain L. V. Manspeaker, U. S. R., died on February 9, 1918.

The losses by death during the year were as follows:

A. H. Stead	James Burke
Prof. C. L. Crandall	W. S. Danes
H. A. Weaver	C. W. Beam
Captain L. V. Manspeaker, U. S. R.	G. F. Cotter

By references to the Financial Statement it will be noted that the cash balance on hand at the end of the fiscal year, December 31, 1917, was $30,894.48. The Association has subscribed for $3,500 of Liberty Bonds and $1,000 of the Canadian Victory Loan.

In addition to the usual number of Bulletins and the annual volume of the Proceedings, issued during the year, the General Index to the Proceedings has also been published. This latter publication will make the vast amount of data in the several volumes more readily accessible.

The reports presented for consideration by the respective standing and special committees are of great value and interest. Taking cognizance of the prevailing conditions, several of the committees have submitted information that is of distinct service at the present time.

The chairmen, vice-chairmen and members of the several committees deserve credit for the good work performed during the past year, more particularly in view of the fact that such work has been performed under difficulties due to the war conditions.

Financial Statement for Calendar Year Ending December 31, 1917

Balance on hand January 1, 1917		$30,809.38
RECEIPTS		
Membership Account		
Entrance Fees	$ 1,130.00	
Dues	5,538.50	
Subscriptions to Bulletin	5,538.50	
Binding Proceedings and Manual	620.30	
Badges	22.00	
Sales of Publications		
Proceedings	4,068.88	
Bulletins	708.79	
Manual	1,159.00	
Specifications	68.90	
Leaflets	134.35	
General Index	346.25	
Advertising		
Publications	2,835.80	
Interest Account		
Investments	562.50	
Bank Balance	122.91	
Annual Meeting		
Sales of Dinner Tickets	1,032.50	
Miscellaneous	19.48	
American Railway Association		
Rail Committee	5,659.20	
Total		$29,567.86
DISBURSEMENTS		
Salaries	$ 5,962.66	
Proceedings	5,607.90	
Bulletins	5,039.89	
Manual	43.20	
General Index	1,134.78	
Miscellaneous Stationery and Printing	499.82	
Rents	1,140.02	
Light	30.40	
Telephone and Telegrams	147.47	
Equipment	57.50	
Supplies	396.26	
Expressage	518.96	
Postage	786.27	
Exchange	56.25	
Audit	200.00	
Impact Tests on Electrified Railways	250.99	
Annual Meeting Expenses	1,819.80	
Miscellaneous	116.39	
Rail Committee	5,674.20	
Total		$29,482.76
Excess of Receipts over Disbursements		$ 85.10
Balance on hand December 31, 1917		$30,894.48
Consisting of:		
Railroad Bonds	$25,574.57	
Liberty Bonds	2,500.00	
Canadian Victory Bond	991.08	
Cash in S. T. & S. Bank	1,803.83	
Petty Cash Fund in Secretary's office	25.00	
	$30,894.48	

STRESSES IN TRACK FUND

Balance on hand January 1, 1917	$ 4,126.36
Received from interest during 1917	110.39
	$ 4,236.75
Disbursements	$ 1,547.78
Balance of fund on hand in Standard Trust & Savings Bank, December 31, 1917	$ 2,688.97

Respectfully submitted,
BOARD OF DIRECTION.

REPORT OF THE TREASURER

Balance on hand January 1, 1917		$30,809.38
Receipts during 1917	$29,567.86	
Paid out on audited vouchers during 1917	29,482.76	
Excess of Receipts over Disbursements		$ 85.10
Balance on hand December 31, 1917		$30,894.48
Consisting of:		
Railroad Bonds	$25,574.57	
Liberty Bonds	2,500.00	
Canadian Victory Bond	991.08	
Cash in S. T. & S. Bank	1,803.83	
Petty Cash Fund in Secretary's office	25.00	
	$30,894.48	

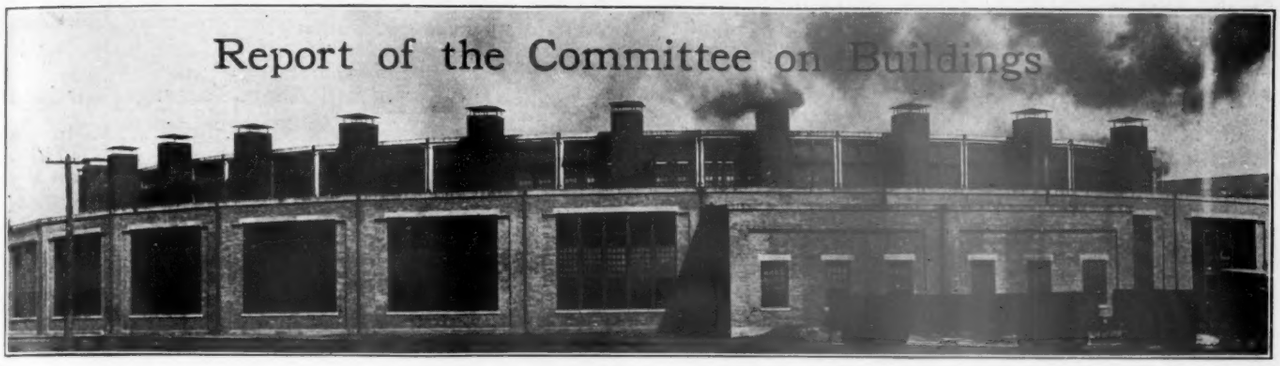
STRESSES IN TRACK FUND

Balance on hand January 1, 1917	$ 4,126.36
Received from Interest during 1917	110.39
Total	$ 4,236.75
Paid out on audited vouchers during 1917	1,547.78
Balance of fund on hand December 31, 1917	$ 2,688.97

The securities listed above are in a safety deposit box of the Merchants' Loan & Trust Safe Deposit Company, Chicago.

Respectfully submitted,
GEO. H. BREMNER, Treasurer.

Report of the Committee on Buildings



THE COMMITTEE had no recommendations to make as to the Manual, but submitted a series of definitions pertaining to the subject of "Buildings" as a progress report. The committee also submitted a report on safety-tread devices for stations and a report on the relative merits of high and low platforms for passenger stations.

Definitions

STATION.—A building for the accommodation of passengers or freight at termini or an intermediate points.

PASSENGER STATION BUILDING.—A building serving as a starting point or stopping place for passengers.

FREIGHT STATION BUILDING.—A building used exclusively for the receipt, storage, transfer, or delivery of freight.

COMBINATION STATION BUILDING.—A building used jointly for the accommodation of passengers, and for the receipt and delivery of freight.

TRANSFER SHED.—A long platform, generally covered and placed at distributing points on a railroad system, where loads for miscellaneous destination may be redistributed into full carloads for final delivery. These are sometimes combined in a freight house layout and called transfer platforms.

TRANSFER CRANE.—A stationary crane, having side supports and bridge framed together, spanning tracks, and used to facilitate the handling of heavy commodities from cars to tracks or vice versa.

GANTRY CRANE.—A power-driven crane with supports and bridge framed together, made to travel on a level grade, spanning tracks and running parallel to same, used for loading or unloading heavy commodities.

SHOP BUILDINGS.—Various structures for the making of repairs to locomotives, engine erecting, boiler and blacksmith work, car building and repairing, dry kiln for lumber, and other branches of work.

ROUNDHOUSE.—A semi-circular building, containing locomotive stalls centering toward a turntable or yard. These houses equipped with drop pits for cleaning and repair of locomotives; truck, driver and tender wheel pits at right angles to drop pits and covering at least two stalls for dropping the several wheels mentioned. Houses are sometimes fitted with traveling or stationary cranes for removing various parts of locomotives. When a house is built in rectangular form, the name "roundhouse" would hardly apply. The name "engine-house" would no doubt be more suitable.

TURNTABLE.—A revolving platform for turning locomotives or cars.

TRANSFER TABLE.—A traveling platform driven transversely for moving locomotives or cars from one parallel track to another.

COALING STATION.—A structure or appliance for the storing and delivering of coal to tenders.

SAND HOUSE.—A structure for the drying and storing of sand and delivering same to locomotives by gravity.

OIL HOUSE.—A structure above ground or a basement pit for the storage of oil tanks containing the various oils used for locomotives, cars and shop requirements.

WATER STATION.—A large receptable or structure, built of wood, concrete or metal, for the storage of water supplying engine tanks and yard facilities.

PUMP HOUSE.—A building at or near a water supply station, containing the pumping apparatus.

SIGNAL TOWER.—A tower or structure from which to display a semaphore or other signal or to operate mechanical signals approximately to same.

INTERLOCKING TOWER.—A tower or structure containing the mechanism for operating the switches and signals in yards when of the interlocking type.

HOSE HOUSE.—A structure containing hose and other equipment in yards or other places for fire protection.

WATCH BOX.—A shelter at a road or street crossing to protect the crossing watchman.

TOOL HOUSE.—A storage place for shelter and safety of tools or other equipment used for track maintenance.

SECTION HOUSE.—A structure for housing section foreman and family.

BUNK HOUSE.—A structure for housing track or other railway laborers.

SUBWAYS.—An underground passageway at certain types of passenger stations leading from main building across under tracks. Where intermediate platforms occur, inclines or stairways are provided, leading from the main passage up to the train floor level. By this arrangement passengers are enabled to reach or leave trains without crossing tracks. Subways are sometimes used for other purposes, such as the handling of baggage in place of stairs or inclines. Elevators are installed at certain points for raising and lowering trucks from the sub to the main floors of buildings.

STOCK YARD.—An enclosure for stock, usually built with a running board fence. The enclosure is subdivided into pens facing on alleys or runways. This runway connects up with an incline and loading platform. Pens are sometimes fitted with feeding racks and water connections for taking care of stock till ready for loading, and shipping to destination.

POWER HOUSE.—A structure containing apparatus for supplying power, air, steam and current for various purposes.

SUB-STATION.—A structure containing apparatus for transforming and distributing electrical current.

WAREHOUSE.—A building used for the storage of freight.

STORE HOUSES.—Buildings for the storage and distribution of miscellaneous materials used in railway work. Oil basements are sometimes built in connection with

storehouses. Tanks are placed in an underground basement and filled by gravity from tank cars. Oil is distributed from the main floor by self-measuring pumps.

SCRAP BINS AND PLATFORMS.—A facility for the collection of cuttings and other merchantable scrap until disposed of.

CAR REPAIR SHEDS.—Buildings grouped in connection with car repair yards for shop work of various kinds in connection with same. These buildings are sometimes built with open sides, when more than one track, house provision should be made for ample light from overhead for lighting the working space between lines of cars.

ICE HOUSE.—A structure for the storage and distribution of ice for trains or other uses and the protection of perishable freight.

OFFICE BUILDING.—A structure for the accommodation of clerical, telegraphic, engineering or other forces.

REST ROOM.—A structure containing rest and recreation rooms, sleeping quarters, lunch rooms, lockers, baths, etc., for the accommodation of trainmen and other employees at terminals.

PIER (Dock or Wharf).—A covered or open structure extending out into the navigable waterway, or parallel to the shore of same for the receipt or delivery of freight from or to vessels with tracks on or adjacent to same, where used in connection with railway terminal.

LOCOMOTIVE WASHING PLATFORM.—A slightly depressed platform under engine tracks in terminals. These are used for washing and cleaning engines, and are drained to sewer.

THAWING SHED.—An insulated, heated structure used for thawing out frozen commodities in bulk at export terminals.

MONITOR.—A raised portion of roof to obtain light or ventilation from vertical sides or ends.

PENT HOUSE.—A projection above the roof of a building to provide exit onto roof, house elevator machinery or other similar purposes.

BENT.—A structural unit in a trestle or framed structure, placed at regular intervals.

PLATFORMS.—A raised walk upon which passengers alight from railroad cars. Platforms are built of wood, concrete, brick or cinders.

SAW TOOTH TRUSS.—A special form of room construction built in bents having a vertical or slightly sloping face. This portion of bent is glazed and usually built facing the north, so as to obtain light without sun rays.

ELEVATOR.—A building used for storage, cleaning, grading and distribution of grains.

TRAIN SHED.—Usually built covering two or more tracks. Roof and sides generally fitted with skylights or prismatic skylights and slots for ventilation.

BUTTERFLY SHEDS.—Usually a one-post structure having spreading eaves with drainage sloping back to center of same.

UMBRELLA SHEDS.—Same as butterfly, but roof slopes to outer edges. These sheds are built on depot platforms between lines of track and afford only partial protection to passengers.

SCALES.—An apparatus for weighing freight and baggage. In freight houses the dial scales are generally used. They afford quick reading of weights, and tend to rapid handling of loads over scale platforms. Track scales are used for weighing loaded or empty cars.

SCALE HOUSE.—A small structure generally built in connection with track pit and scales. Scale beams are brought up inside of building.

Provisions to Insure Safe Walking in and About Passenger Stations

Avoid steps and stairways where inclines and ramps can be satisfactorily used instead. Avoid any combination of sloping surfaces and steps.

Consider both the general design and details of stairway construction with a view of handling crowds of people with the individuals moving in parallel lines with ease and with safety, against slipping and falling, keeping such movement free from interference by other lines of travel Place important stairways conspicuously in the main line of travel, keeping such travel in straight lines where possible. Arrange so that crowds at the head and foot of stairways can naturally assemble and disperse, with a minimum amount of confusion and cross-currents of walking. To this end, provide corridors or vestibules at the top and bottom of stairways, where possible, using the same width as for the stairway. Such corridors should open directly into the room served without any funnel-shaped entrances, and with plenty of room for quick distribution. Locate minor stairways away from regular lines of travel, and avoid combinations of service or minor stairways, with main stairways. Consider possible lighting arrangements, particularly from natural light, avoiding locations where stairways will be poorly lighted in cloudy weather or where they will appear dark to a person entering them from bright sunlight.

For main stairways, use a straight run of steps and landings wherever architecturally possible. Where turns cannot be avoided, provide landings and, if possible, restrict the turn to ninety degrees.

Proportion the width according to the character of traffic handled, the extent to which hand baggage will be carried, and the maximum stairway capacity desired during rush hours. Be guided by experience with local requirements rather than by thumb rules, bearing in mind that main stairways should be maintained wide enough so as not to check the movement of crowds, and that the width of minor stairways should often be determined by the rate at which people may continue to move away from them. Bevel, or round, landings to maintain a constant width, and keep people moving in concentric, or parallel lines. Where two stairways unite at a landing and form a single stairway, make the width of the latter equal to the combined widths of the other two. For minor and service stairways, use no width less than 3 ft. between hand rails.

The pitch of stairways, i. e., the inclination as determined by the dimensions of treads and risers, and the frequency and proportion of landings, should be such that stairways may be ascended with ease, and as nearly as may be with a free natural walking step. To fix the pitch and landings properly, the following should be approximately observed:

Provide treads not over 13 in. nor less than 11 in. in width, and risers not over 7 in. nor less than 6 in. in height; and make the sum of two risers and one tread be between 25 in. and 26 in. The width of treads should be taken as the horizontal distance face to face of risers. Where stairways require more than 16 risers, provide intermediate landings, keeping the length of single flights as near to 10 or 12 risers as may be possible. Use no steps with less than three risers. Where feasible, provide the same height of risers and width of treads for all stairways used by the traveling public in any one building. Always make risers and stringers of closed construction. Make the width of landings in the direction

of travel not less than four feet. Avoid, if possible, all minor entrances on landings or at the top or bottom of main stairways. If this cannot be done, provide suitable lengths of landings, so that doors can be opened and used freely by any minor class of traffic without, in anywise, causing interference with travel at the main stairway.

Provide hand rails on both sides of all stairways and center rails on stairways eight feet wide, and additional rails to keep the distance between adjacent hand rails not less than 3 ft. nor more than 6 ft. Where intermediate hand rails are used, a double hand rail is recommended. Place center line of hand rails at least 5 in. from face of sidewalls, or 8 in. center to center for intermediate hand rails. Make section of hand rail rigid to give uninterrupted travel for a secure grip. Provide a hand rail without sharp drops or raises, extend it beyond the last riser and turn it downward so that it offers no entanglement for clothes or baggage. Curve hand rails at all bends on landings. Provide such balustrades and hand rails as will prevent small children from falling or getting through them. In this connection, consider the use of curb to divide stairs under the center hand rails. Place top of hand rail 34 in. above tread, measured on line of face of riser. On the open side of stairways, provide barriers at least 42 in. high, to guard against accidental falls of persons over the balustrade. At intermediate hand rails, provide newels not less than 6 ft. high, and secure the rails to them without encroaching on hand clearance. Provide newels which will not present sharp edges and corners.

Obtain the necessary drainage at the ends of the treads, and not by sloping the surface in the line of travel. Where used, the nosings on treads should be limited to a projection of 1 in. Provide approved safety treads on all main stairways, using a renewable type securely fastened.. Make the length of safety tread 4 to 6 in. shorter than that of the stair tread, and use a width of safety tread of from 5 in. to 8 in. Place the surface of the safety tread flush with the surface of the balance of the stair tread. Consider means, such as color schemes, which, used in connection with safety treads, will clearly indicate the location of the steps, particularly the outer edge or nosing. The use of wide safety treads, particularly those covering the entire width of the step, are of questionable necessity and value, as they present a uniform appearance for the entire flight of steps, and make it difficult for people to clearly see where they are stepping.

Where feasible, enclose, or roof over, all outside stairways not only to keep off sleet and snow, but also to prevent a slippery condition, due to rain and mud. Do not provide open risers. In choice of safety treads for outside stairways, consider means which will have to be used during winter weather to maintain the surface of steps in good condition.

Place no signs, mirrors or other objects of interest where they will attract the attention of persons using stairways, except such signs as are necessary to direct travel.

In making lighting arrangements, consider that many people with poor eyes cannot, at best, see very clearly in descending stairways, particularly when the appearance of the treads is uniform throughout. Provide ample natural and artificial light, avoiding direct light and shadows, and making certain that lights from adjacent rooms do not shine directly into the eyes of people using stairways.

In the choice of materials and arrangements, consider the maintenance conditions that will exist in daily use, particularly those in wet and stormy weather just before stairways are cleaned, and also give consideration to that poorest condition of safety treads and other parts which will exist just before renewal is required and made.

Design and Merits of High and Low Platforms at Passenger Stations

While very few railroads in this country have adopted platforms level with the car floors, they have always been the standard in use in Great Britain.

It is recommended that the following be taken into consideration in considering the adoption of high platforms:

(1) The facility and rapidity with which trains may be loaded or unloaded.

(2) The prevention of the public crossing the track.

(3) In stations below the street level, a saving of about 3 ft. in the vertical height to be traveled by the passengers.

(4) They form a convenient place for the housing of ducts, cables, signal equipment and sometimes elevator machinery.

They have certain disadvantages when used in conjunction with our present system of terminal operation:

(1) (Most important)—The cost of changing passenger equipment to serve both high and low platforms.

(2) The difficulty of trucking across the tracks.

(3) The necessity for a special form of baggage trucks having a low floor.

(4) The disadvantage of placing a switch within the limits of the platform.

The committee recommends that the Association recommend to the Master Car Builders' Association that all cars in future be so constructed that they will fit either high or low platforms.

Conclusions

1. The committee recommended that the definitions be received as a progress report.

2. It recommended that the conclusions and recommendations relative to safe walking surfaces about passenger stations be approved and published in the Manual.

3. It recommended that the conclusions regarding high and low platforms at passenger stations be adopted and published in the Manual.

The committee recommended that the other subjects be reassigned for the coming year.

Committee: M. A. Long (B. & O.), chairman; G. H. Gilbert (Southern), vice-chairman; Geo. W. Andrews (B. & O.), D. R. Collin, W. H. Cookman (P. R. R.), C. G. Delo (C. G. W.), W. T. Dorrance (N. Y. N. H. & H.), K. B. Duncan (A. T. & S. F.), C. H. Fake (M. R. & B. T.), A. T. Hawk (C. R. I. & P.), F. F. Harrington (Virginian), E. A. Harrison (A. T. & S. F.), A. Larsen (S. N. E.), J. W. Orrock (C. P. R.), S. B. Phillips (U. P.), R. V. Reamer (C. R. R. of N. J.), C. W. Richey (P. R. R.), John Schofield (C. N.), Z. H. Sikes (N. Y. C.), W. J. Watson.

Discussion

M. A. Long (chairman): We have ten subjects, and the committee this year concentrated its work on subject No. 6. "Report on Safety-Tread Devices for Stations Exposed to the Elements," and on No. 8, "Report on Design and Merits of High and Low Platforms at Passenger Stations." The other subject we did work on, but these portions of the report are only offered as progress reports.

Referring to subject No. 6, I want to call attention to the fact that we have changed the title to make it broader in scope. It now reads: "Provisions to Insure Safe Walking in and About Passenger Statons." The wording "safety tread" seemed to us to touch on a small part of the subject, and therefore we have made the title broad

enough to cover the whole subject of safety walking in and about a passenger station layout. This subject was treated very fully.

We ask that the first part of the report be received and published in the proceedings. Our conclusions we recommend for acceptance and to be published in the Manual.

The President: The chairman is of the opinion that this subject has been given pretty careful consideration by the committee, and unless there is some desire to the contrary, it will be sufficient to take these as a body, and if there is no discussion you will probably suggest a motion that these be published as recommended. We will read the titles and give time for discussion. If we hear none we will assume that there is absolutely no discussion or adverse criticism. The matter of pitch and landings is rather important here, and I would like to have a little time given to that.

C. E. Lindsay (N. Y. C.): In our experience, we have had quite a number of acidents on stairways, and our investigations disclosed that the grade of the stairway, of the flight, was the important thing. Slight variation of rise or tread did not cut so much figure as long as the nosing was in a uniform grade line. Did the committee cover that point?

Mr. Long: The committee covered that point. We canvassed the situation very thoroughly, especially in New York, and got what we found was a good average, which that recommendation will give you.

The President: If there is no further discussion, these conclusions will be adopted and printed in the Manual.

Mr. Long: Subject No. 8. This report was recommended for publication in the Manual. The committee would request that this be turned back for another year.

The President: If there is no objection the subject will be reassigned to the committee.

The committee was dismissed with the thanks of the association.

Report on Conservation of Natural Resources

THE COMMITTEE PRESENTED a digest of previous reports to show at a glance the ground which has already been covered and the more important features of the reports which have already been made. This abstract outlined the results of the committee's investigations into the subject of timber conservation, particularly including reforestration, treatment of wood, protection of forests from fire, and the utilization of the by-products of timber. This report tended to show the excessive waste which has accompanied the use of timber up to the present time.

Coal Resources of Canada

The coal reserves of Canada are considerable, but a large proportion is unsuitable for use in the ordinary way as locomotive fuel. The coals of Manitoba, Saskatchewan and portions of Alberta are lignite or subbituminous coal, high in moisture, and cannot be used as locomotive fuel on account of the liability of setting out fires from excessive sparking. In 1916, the railways of Canada consumed over 8,675,000 tons of coal and nearly 50,000,000 gal. of fuel-oil, both of which have, during the last few years, steadily increased in price. On account of our large imports of coal and fuel-oil, anything that can be done to increase the efficiency of generating power from coal or to economically curtail the use of fuel-oil by the substitution of Canadian coal or lower grade "sparking" fuels should be investigated and introduced as soon as possible. Coal or lignite burned in the powdered form does not produce sparks, but burns in a similar manner to a gas. During the last few years this class of fuel has been used with success in connection with locomotives, stationary boilers, and various metallurgical industries. It is anticipated that, within a short time, it will be used to a much greater extent in Canada.

Water Power for Railway Purposes

The interest which railways have in water powers may be classed as indirect and direct. The former is probably by far the most important of the two and relates to increase in traffic brought about by the industrial development which water powers have made possible. The direct connection between railways and water powers comes through their electrification by utilizing the latter in the supply of hydro-electric energy. That main line electrification of railways has not been more extensive in Canada is not due to lack of water power possibilities, but rather owing to the more important factors connected with this question, such as amount of traffic, frequency of service, etc. Thus far, if we exclude street and suburban lines, railway electrification in Canada has been confined to serve special purposes such as in the Canadian Northern tunnel, at Montreal; the St. Clair tunnel of the Grand Trunk, and the Detroit tunnel of the Michigan Central.

While main line electrification on a large scale for purely economic reasons may yet be far remote, we may look forward to a number of possibilities in the near future from the indirect benefits of electric operation. These often are controlling in any installation, and among them may be mentioned smoke elimination in tunnels and underground terminals, overcoming the smoke nuisance on surface lines in large centers, and increased comfort, speed and attractiveness in passenger service. Whatever may be the future of electrification in Canada, and whether conditions warrant it to be effected on a large or small scale, the generously distributed water powers of this country will always be an additional incentive in any project of this character.

Considerable work has been done by the Canadian Pacific in the direction of tree planting to replace portable snow fences. This work was first carried on in the prairie provinces, and the results secured are reported as being quite satisfactory. It may be interesting to know that on a section of the Canadian Government Railways —between Campbellton, N. B., and Bathurst, N. B.— there are spruce hedges primarily planted in order to protect the track from snow drifts, and which have in the course of years not only proved effective in that respect, but have appealed to the artistic taste of travelers.

Treated Timber

One difficulty in the way of the general use of treated ties by Canadian railways is the fact that there are, so far as known, only five plants in Canada at which rail-

way ties can be given preservative treatment on a commercial scale. These plants are at Vancouver, B. C.; Transcona, Man.; Fort Frances and Trenton, Ont., and Sydney, N. S. It will thus be noted, for example, that for Quebec and the greater portion of Ontario, no tie-treating plants are conveniently accessible. From one-third to nearly one-half of the ties used in Canada are jackpine. The increasing price and decreasing supplies of accessible material of this species suitable for the manufacture of ties, are necessarily bringing about serious consideration of the use of hardwoods, including birch, maple and beech. Of these, there are very large supplies of birch available in the more northerly forests of eastern Canada. Beyond any question, the hardwoods are admirably adapted to use as railway ties, providing they are given preservative treatment. This is indicated by the fact that between two and a half and three million ties of beech, birch and maple are now used annually in the United States. The use of these species has increased rapidly, the use of birch being first reported on a material scale in 1915.

In Canada, the use of birch for railway ties is in its infancy. Experience generally appears to indicate clearly that the use of birch ties without preservative treatment is undesirable, since the life of such ties is restricted to four or five years. However, with preservative treatment, the evidence indicates that such ties will have a life of twenty to twenty-five years.

Specific information with respect to this has been secured from the New York Central and Toronto, Hamilton & Buffalo. G. W. Vaughan, engineer maintenance of way of the New York Central, reports that during the past four years the company has used about 98,000 yellow or red birch ties. All of these have been treated with creosote at a cost of approximately 31cts. per tie. Mr. Vaughan states that he considers the life of birch ties untreated to be four years and treated, about 20 years. R. L. Latham, chief engineer, Toronto, Hamilton & Buffalo, reports that his company has been using from 20,000 to 25,000 birch, beech and maple ties per annum during the past three years. Of these, approximately 40 per cent. were birch, mostly yellow birch. All of these ties have been given a treatment of approximately 2½ gal. of creosote per tie. Mr. Latham considers the average life of an untreated tie to be approximately five years and of a creosoted tie from 20 to 25 years. The experience of this company is that beech, birch and maple all take treatment nicely and give splendid service when given the proper creosote treatment.

It is believed that the railways in Canada could render a very great service in forest conservation by investigating most carefully the possible use of yellow birch for railway ties and by bringing about, in one way or another, the construction of additional plants for giving preservative treatment to ties and other timbers.

Relation of Railways to Conservation Projects

Forest fire protection is a conservation problem in which the railways are interested both directly and indirectly. Information received through the Fire Inspection department of the Railway Commission indicates that on the whole very gratifying progress has been made in the direction of reducing fire losses along railway lines, due to railway agencies. Large areas of cut-over and burned-over non-agricultural lands along railway lines throughout Canada are again growing up to young forest, and it is of great importance that such reproducing areas be saved from further damage by fire. Such a course would add greatly to the attractiveness of the country from a tourist point of view, to say nothing of reducing damage claims and the prospect for future freight traffic when such forests reach maturity. Considering the enormous areas involved, the prospects for future freight traffic from areas now carrying young forest growth are well worth the most careful consideration. Such areas will also serve as a source of supply for cross-ties, poles, posts and other timbers necessary to railway maintenance and operation.

Scrap Reclamation

The attention of the committee has been called to recent developments in saving and using what has heretofore been considered scrap material. Among the notable examples of this comparatively new industry are the plants of the Atchison, Topeka & Santa Fe at Corwith, Ill., near Chicago; the plant of the Chicago & Northwestern at the West Chicago shops of that company, and others. Another feature of economy worthy of mention recently developed is that of repairing frogs and switches by the oxy-acetylene method. It is being successfully used by a number of railroads.

Future Work

The committee recommends that the following subjects be reassigned for the coming year.

Report on the relation of railways to the different conservation projects, reviewing work that has been done by each company up to the present time, and make recommendations on policies economical for railways to follow.

Report on measures for the conservation of human life and energy, in order to promote efficiency.

Committee: R. C. Young (L. S. & I.), chairman; S. N. Williams, vice-chairman; R. H. Aishton (C. & N. W.), W. K. Barnard, C. B. Brown (Intercolonial), Moses Burpee (Ba. & Ar.), C. H. Fisk, E. E. King, C. F. Koppisch (S. N. E.), William McNab (G. T.), J. L. Pickles (D. W. & P.), J. W. Votey (Univ. of Ver.), W. C. Willard.

Discussion

(Prof. S. N. Williams, vice chairman, read the printed statement regarding the assignment of work of the committee and continued in part as follows:)

Before passing on to the conclusions of the report, there are one or two points which I wish to present to you. In the first place, we have practically received orders throughout the nation at the present time to save. That order could not be expressed more briefly and yet fully in case we undertook to send it across the waters to some distant point on the other side of the globe.

One of the most recent movements with reference to economy is the use of pulverized coal. The daylight saving plan, which has been discussed so much during recent months, has been officially approved by the Government and will be shortly put into operation.

There is one thing I have regretted to see, and that is according to the Federal Fuel Administration, 30,000,000 tons of impurities, such as slate, rock, etc., mixed with the coal which was sold in the various states. On the other hand there is one thing which I have seen with pleasure, and that is, that the New York, New Haven & Hartford estimates that the yearly fuel saving has amounted to more than 1,300,000 tons of coal, based on comparison of actual performance of locomotives in December, 1917. The Pennsylvania lines have announced recently that they have been specializing in car conservation with excellent results, chiefly by permitting the intensive utilization of car space.

A statement is made in the *Railway Age* of January 11, 1918, that the Canadian Pacific has developed 419 ready-made farms, each complete with house, barn, fencing, well, and a portion of the land under cultivation. In

9 months it has colonized nearly 500 bona fide emigrant settlers on its lands, and deserves to be classed as a nation builder. Also it makes loans of $2,000 to new settlers on certain lands, extends payment for all farms over a period of 20 years.

I regret very much to see that the fire losses in this country have been increasing. In the year 1917 they were $30,000,000 more than in 1916. I do not dare to tell you what the total was.

One of our subjects is the conservation of human life. A well known statement may be quoted here—"human life and human efficiency are the two most previous things on earth." The United States Public Health Department is doing great service in the prevention of the spread of some of the communicable diseases. In that same connection we might remember that the Bureau of Mines in Washington has done a great deal of work in spreading information as to the saving in the use of coal.

We recommend that subjects 5 and 6 be reassigned for the coming year, and that these appendices be received as information, and we regret that space did not allow a larger and more complete presentation of the subject.

(R. K. Graham (A. T. & S. F.) gave a brief account of the reclamation work done by the Santa Fe in its scrap yard at Corwith (Chicago), Ill. He described the various buildings making up the plant and outlined the results secured. The committee was then dismissed with thanks.)

Report of Committee on Signals and Interlocking

FIVE PLATES COVERING revisions of symbols were submitted to bring the Manual in accordance with revisions adopted by the Railway Signal Association. It was recommended that these five plates of symbols, the first four of which are revisions of those now shown in the Manual, and the fifth being a new one, be adopted and inserted in the Manual in place of those now shown.

R. S. A. Specifications

The committee submitted the following list of matters acted upon by the Railway Signal Association at its convention in 1917 and adopted by letter ballot:

Text.

Alternator (Specifications).
Battery, Storage:
Alkaline, Instructions for Maintenance of.
Electrical Instruments, D. C., Specifications for Ranges and Scales.
Ground Apparatus, Made, for Lightning Arresters (Specifications).
Hand Lantern Globes (Specifications).
Impedance Bond (Specifications).
Lightning Arresters, Made, Ground Apparatus for (Specifications).
Pipe Lines, Field Construction of.
Reactors, Air-cooled, for Line and Track Circuits (Specifications).
Resistors for Line and Track Circuits (Specifications).
Switchboard Material (General Specifications).
Switchboard Material (Requisite Sheets).
Transformers, Single-phase Line, Oil-immersed Self-cooled Outdoor type (Specifications).

Drawings.

Ballast and Rail Resistance Test Chart	RSA	6
Cable Post, Relay Box, Mountings	RSA	1374
Deflecting Bars	RSA	1069
Deflecting Stands, Horizontal Adjustable	RSA	1396
Electrical Instruments, Scale Ranges for	RSA	1378
Ground Resistance, Test for	RSA	1377
Hand Lantern Globes	RSA	1394
Lightning Arrester Grounds	RSA	1424
Rail Resistance Chart, Ballast and	RSA	6
Relay Boxes—Sizes "A" and "B"	RSA	1182
Relay Box—Size "A" (Details)	RSA	1184
Relay Box—Size "B" (Details)	RSA	1183
Relay Box and Cable Post Mountings	RSA	1374
Relay Box Fittings	RSA	1369
Relay Box Inlet Bracket	RSA	1367
Relay Box Linings and Terminal Boards	RSA	1368
Thermometer (Stationary Lead Type Storage Battery)	RSA	1375
Track Circuit Test Chart	RSA	4

It was recommended that this list of Railway Signal Association specifications and standards be published in the Manual, as supplementary to the list heretofore inserted.

Separation of Signals Into Types

The sub-committee assigned to report on the feasibility of separating into distinct types of their own (a) the signals for train operation and (b) the marker or signs which indicate the location or position, or both, of information signs and switch signals for conveying information to trainmen, reported that some of the so-called signs govern train operation just as much as the movable semaphore of an interlocking or block signal system and that these signs are recognized in the standard code of the American Railway Association as signals. The note as to the definition of fixed signals from the rule book of the A. R. A. reads as follows: "The definition of a 'Fixed Signal' covers such signals as slow boards, stop boards, yard limits, switch, train order, block, interlocking, semaphore, disc, ball or other means for displaying indications that govern the movement of a train." Eleven designs were submitted covering the following signs: stop, speed limit or slow, resume speed, yard limit, station one mile, yard one mile, junction one mile, crossing one mile, draw one mile, highway crossing whistle post, flanger sign.

The sub-committee was not ready to report on the switch target, derail sign and trackpan sign. It was recommended that the signs submitted be adopted and included in the manual. It was recommended by the committee that the report on the comparative merits in various locations of alternating current and direct current for operation of automatic signals be discontinued, as it was agreed the comparative values of the two systems depend entirely upon local conditions.

Recommendations for Next Year's Work

The committee considers that no further work can be done on the investigation of the relative merits in various locations of alternating current and direct current for the operation of automatic signals, and recommends that same be considered closed.

It further recommends that the following subjects be continued:

1. Make critical examination of the subject-matter in the Manual and submit definite recommendations for changes.
2. Report on the problem of signaling single-track roads with reference to the effect of signaling and proper locations of passing sidings on the capacity of the line.
3. Report on the specifications adopted by the Railway Signal Association, which, in the judgment of the committee, warrant consideration, conferring with the committee on Track on any appliances affecting track.
4. Report on the desirability of providing in connection with an automatic signal system:
   (a) An overlap.
   (b) Approach restricting speed indications.
5. Report on the various types of light signals for day and night indications.
6. Report on the feasibility of separating into distinct types of their own, the signals for train operation, and the

markers or signs which indicate the locations or position, or both, of information signs and switch signs for conveying information to trainmen, and design suitable day and night (if necessary) markers or signs for switches, derailing switches, stop signs, slow signs, resume speed signs, water station and trackpan markers, highway crossing sign, etc.

7. Report on requisites of signal locations for automatic block signals for single-track roads.

8. Report on automatic train control.

10. Report on applications of aspect indicating that train must take siding at a non-interlocked switch.

Committee: J. A. Peabody (C. & N. W.), chairman; W. J. Eck (Southern Ry.), vice-chairman; Azel Ames, C. C. Anthony, H. S. Balliet (N. Y. C.), A. M. Burt (N. P.), C. A. Christofferson (N. P.), C. E. Denney (N. Y. C. & St. L.), F. L. Dodgson (G. R. S. Co.), C. A. Dunham (G. N.), W. H. Elliott (N. Y. C.), G. E. Ellis (I. C. C.), M. H. Hovey, J. G. M. Leisenring (I. T. Co.), H. K. Lowry (C. R. I. & P.), J. C. Mock (M. C.), F. P. Patenall (B. & O.), A H Rudd (P. R. R.), W. B. Scott (S. P.), A. G. Shaver, T. S. Stevens (A. T. & S. F.), W. M. Vandersluis (I. C.), B. Wheelwright (G. T.).

Discussion

J. A. Peabody (chairman): Our committee were assigned 10 subjects, on which we are giving definite reports on four. Instead of going through these generally to start with, I will take up each one individually. First, the revision of the Manual.

(This was accepted and approved for publication in the Manual.)

Mr. Peabody: In part 2, report on handling signaling and proper location of sidings on single-track roads, we simply report progress. We have made considerable progress on this subject, and were able to make our report to the Signal Association, which will be reported to this association next year.

The next report on subject number 3, report on specifications adopted by the Railway Signal Association, we submit in Appendix B and move that this be printed in the Manual as information.

C. A. Lindsay (N. Y. C.): At the last convention we established a precedent in this regard, in the acceptance in blanket of the recommendations of the Railway Signal Association. I have the highest respect for the work done by that association, and ordinarily this association can accept most of its conclusions without questions.

It seems to the Committee on Outline of Work that it would be wise before accepting the entire blanket that now and hereafter recommendations of the Railway Signal Association be received and submitted to such a committee as may seem proper, for the purpose of criticism and report at the following convention. I move that this report be received for printing in the Manual subject to the criticism of such committees as the Committee on Outline of Work may deem necessary.

Mr. Peabody: It hardly seems to me that that is necessary, inasmuch as we are submitting this question as information to the members, and not to be adopted as standard by this association.

Mr. Lindsay: Our association does not adopt standards, and the Manual has a certain prestige, and carries with it the approval of this association of everything that is printed in the Manual. I think we ought to be very careful, and I think the Committee on Signals ought not to object to having its work reviewed by the other committees.

C. W. F. Felt (A. T. & S. F.): I think it is therefore desirable to follow the course outlined by Mr. Lindsay.

Mr. Peabody: It may clear the atmosphere a little if I read the title under which this appears in the Manual. It reads: "List of the findings, conclusions, standards and specifications contained in the Manual of the Railway Signal Association." That does not in any way make this association responsible for those findings. It is simply put there as a convenience for the members of this association in finding this information.

Mr. Lindsay: If we are to take that attitude, that the word of the Railway Signal Association is the last word on signal appliances of all kinds, we might as well not have any Signal Committee.

(After further discussion of this matter, a motion offered by Mr. Lindsay, that the information in appendix B be submitted to the committees interested, and next year again brought before the association with the approval of these committees, was carried.)

(Mr. Peabody here read paragraph 6 of the preliminary portion of his report and also appendix 6 in full.)

W. C. Cushing (P. L. S. W. S.) said in part:

"I am at variance with the committee in its initial point with reference to its report on the feasibility of separating into distinct types of their own; the signals for train operation, and the markers or signs which indicate the location or position or both, of information signs or switch signals for conveying information to train men."

After presenting an analysis of the status of a fixed signal as outlined in the Standard Code and a discussion of the purpose of the various signs in the control of train movements, Mr. Cushing continued:

"It seemed very desirable to me, therefore, to have all of these signal adjuncts of a different form from the main signal system, and as that main signal system is very generally of the semaphore type, it seemed best to have all of the other adjuncts of a different type.

"I do not like the use of the semaphore arm for slow and stop posts at railroad crossings, and for track men when carrying on track work, and for switch signals, etc. They are all fixed in position and the stop post must always be passed in the stop position, whereas the general idea and plan of the semaphore signal is one whose aspects can be changed in order to indicate different train movements."

J. L. Downs (I. C.): This subject is an old one and it is one in regard to which many experts differ. All signs affect train movements to a greater or less degree. The fixed signal in a permanent "stop" position is just as important as any semaphore movable signal that would be at "stop" when stop is desired or "proceed" when proceed is desired. Therefore, it may seem to some that it should carry the same design as the other signals. I am in favor of Mr. Cushing's motion that this matter be deferred until it is gone into more by the association before it is finally adopted.

J. C. Mock (M. C.): The desirability of classifying into their various uses these signals is not, as indicated, a very easy distinction—there are some of them that are on the border line between the one and the other classification, whatever basis you assume for the classification.

The definition of a fixed signal is one of fixed location, which indicates a condition affecting the movement of a train. Very clearly these first three signals do affect the movement of a train. If it were not for the fact that they are a permanent location, giving only one indication, they might quite properly be made to conform to the ordinary semaphore arm indication, and I think very properly, because they do affect the movement of the train just as truly as any signal. The other signals, with the sign in the middle standard, are more nearly information signs, and may not affect the movement of the train; they are too far distant to require any action at

that location, but they invariably will be followed by a signal that does affect the movement of the train.

I think in the past there has been effort made in designing signs of this class or signals, to reduce the lettering to the minimum. In other words, we have here a stop signal lettered stop, whereas the idea as I took it was that we might get away from lettering. The same method has been carried all the way through, and in view of that fact I want to submit the amendment that this matter be referred back to the committee for further consideration on this point.

Mr. Lindsay: As railroading work has developed, we have gotten away from the idea that we must never pass a red blade wherever it is exposed, because we do it every day, mile after mile, train after train. Perhaps Mr. Cushing's objection to the shape of the stop sign might be overcome if we would make a pointed stop and proceed sign. The slow speed sign and the resume speed sign are of great importance with us, and we have adopted a sign that shows reasonably well in daylight and is illuminated at night, with perforated lettering on the front.

My objection to the arm signs is comparatively trivial, but where a yard limit at a junction and a crossing and a drawbridge are all together, near to a station, the place would look like a graveyard. Would not it be possible to have the lettering for those signs put on one sign, so that one stencil can be made to take care of all of them?

Mr. Stevens: It is probably proper that the action suggested should be taken, but the committee will be at a loss to present anything which means exactly what the signs mean that they have presented. They can present you a horizontal board with the word "stop" painted in red, or several different schemes of that kind, which will all mean that a train must stop at that particular point, and do certain things after it has stopped that the rules provide for.

The same argument applies to the 45-deg. sign marked 25 and 15. You can install a horizontal yellow board, or you can mark a horizontal board "slow" and put these numbers on, or you can install the sign as suggested by this committee, which is the almost universal method of indicating caution, or some form of reduced speed.

The same thing is true for the resume speed sign, and the effect on the train will be absolutely the same. It will take permission at that point to resume whatever speed is allowable.

We get away from the daylight sign and come to tackle the night problem, and here is where the difficulty comes in again with getting away from signal colors, because you have only three, red, yellow and green, that you can use satisfactorily. Lunar white, perhaps, is a possible color. But directly you get into the illumination of the signs, you must use the same things that are used on the movable semaphore arms. So I think if those things should be referred back to the committee, it is questionable whether they could submit something else to the association to which there would not be objection.

Louis Yager (N. P.): It seems to me that the association ought to act on this suggestion, that the committee has taken upon itself, to utilize the characteristic aspect of signals, but for the immovable fixed signal, it seems to me that is a step that is to be taken. It will not do any good, as I see it, to submit this back to the committee unless they get some intimation as to how the association feels on the point.

L. M. Perkins (N. P.): I understand this motion to refer this back to the committee will first come to a vote, and I hope it does not pass. I would offer an amendment to that motion, that it be referred for revision in details, and not in general shape. (This was not seconded.)

Mr. Patenall: I would like to point out one factor that must be considered under the field of signaling. If you adhere to various designs of markers by day, do not forget that you cannot have that shaped light at night.

Mr. Cushing's criticism is really the most constructive that we have heard to-day, although I am sorry I cannot align myself in his favor. The appearance of the first three signs would probably portend a simple design. At the same time there is a wonderful difference as to what the engine man is to do. It is not the position that would show that indication of what he is to do, and for that reason there seems to be so little conflict in the designs that we submit in comparison with signals with operative arms, that there is a very small amount of criticism in that direction.

(Mr. Cushing's amendment to the original motion, that the matter be referred back to the committee for further study, failed to carry. The original motion, that the information be adopted and printed in the Manual, was carried. The committee was then dismissed.)

Report of Committee on Rules and Organization

FOR FIVE SUCCESSIVE YEARS the directors have assigned to the committee on Rules and Organization the study of scientific management. Throughout this time very little has been done, apparently, because of a lack of interest on the part of the Association. A thorough and exhaustive consideration and discussion should be had of the necessity and the utility of organization. A like treatment should then be given to the resources which may be used in its development. Having shown the need and discovered the resources, attention should be given to their application and a means of solution presented for any specific problem.

It is hoped that some interest may be aroused among the members and a discussion started which will bring forth a series of monographs. Out of the abundant experience and careful thought of our members we should give freely to the world in its hour of trial. The discussion in the beginning might well be abstract and scientific. At a later date it should pertain directly to the practical and important application of scientific principles to railroad operation. It will be conceded that a careful study of the subject in the unrivaled manner available in our society will achieve far better results than individual study, and no better justification for our being exists at present. To facilitate the study and discussion, the committee submitted a bibliography in which one can readily find abundant information and suggestions for various methods of treatment. Charts have been secured illustrating the maintenance organizations on many of the leading roads. These charts can be furnished by the committee on request, and if desired they may at a later date be published in a Bulletin.

Committee: Jos. Mullen (C. C. C. & St. L.), chairman; F. D. Anthony (D. & H.), vice-chairman; O. F. Barnes (Erie), W. C. Barrett (L. V.), L. L. Beall (A. B. & A.), H. L. Browne (C. R. I. & P.), J. B. Carothers (C. F. & F. W.), S. E. Coombs (N. Y. C.), E. J. Correll (C. H. & D.), Curtis Dougherty (Soo),

H. H. Edgerton (C. G. W.), W. H. Finley (C. & N. W.), B. Herman (Soo), A. J. Himes (N. Y. C. & St. L.), F. D. Lakin (Erie), B. M. McDonald (N. Y. C.), H. A. Osgood (Wab.), E. T. Reisler, W. H. Rupp (G. T.), P. T. Simons, R E Warden (M. P.).

Discussion

(In the absence of the chairman, the report was presented by A. J. Himes [N. Y. C. & St. L.]).

Mr. Himes: There is one subject of more than ordinary interest at the present time, to which the committee has given attention during the year—"The Science of Organization." However, the committee has been busy with other work during the past year, and there appears to have been no demand for a report on the science of organization, and so it has been put aside from time to time for what seemed to be more pressing work.

Certain matter in appendix A suggests the idea that it may be possible, when we have given a sufficient amount of study to the subject of administration and organization, to have a field book covering the subject, enumerating the principles, and stated rules which can be profitably studied and used in great organizations to learn the way more quickly and more perfectly than is done usually in a brief experience.

The bibliography which is presented has been compiled from the library of the American Society of Civil Engineers, and from the New York public library. There are many good books not found in this list, some of them of recent date, which will be added thereto.

It is probably worth while to call attention to the difference between scientific management and scientific organization. I have synopses of four or five different books, among which is "The Principles of Scientific Management," by Frederick W. Taylor, another by Major (now Colonel) Hine and one by Harrington Emerson. These men are all talked of, and I want to point out that whereas Emerson and Taylor gave us scientific management, and the efficiency of the individual, Hine deals with the efficiency of the organization, two things which are very distinct and quite opposite to one another.

Both Taylor and Hine have in mind the elimination of the friction and loss of efficiency due to the chasm which commonly prevails between the primary units of an organization and the principal officers.

We have, of course, to consider and compare the divisional and departmental organizations, line and staff, Hine's unit system and all other forms that may be presented by the different roads represented in the Association and these forms of organization which have been collected by the committee. We have a very great many which I hope some day to put into your hands, so that they may be compared, and it is very much desired that you will all contribute your experience and knowledge.

I want to call your attention further to the type of organization which pervades our thought, to which we, perhaps most all of us, would unhesitatingly subscribe our approval, and to suggest that you give it some careful thought. That is, a single-headed organization of dominant leadership.

Now, are we right about that? Things are undergoing a change, and to compare with that we have the representative organization in which the interests of the primary units shall be paramount. Now, what do you think about that, or, did you ever think of it at all? Is it possible that we shall have an efficient executive organization in which the leadership shall be representative and responsive to the primary units of the organization?

The President: Just at the present time, when the world has had a great lesson in what organization can do, this committee certainly can do a great and wonderful work, and I think that Mr. Himes has outlined a possibility of work that we should all take to heart, and anything we can do in furthering that interest we should do, and what we should do is to study. We have too many organizations to say that any one of them is perfect. We should make a study of them, and as Mr. Himes says, if we condense the information we get from the study of them we will get some good results.

(The committee was dismissed with thanks.)

Report of Committee on Water Service

A CONSIDERABLE NUMBER of changes in the Manual were recommended for adoption. These changes consisted principally of revisions in wording to clarify the meaning. They referred to definitions of scale-forming materials, to methods for the removal of these objectionable ingredients, and to definitions of foaming and means of eliminating or reducing it.

The committee also presented reports on five other subjects, Federal regulation of drinking water, relative merits of continuous and intermittent water softeners, rules for the care of boilers, organization of the water service department and definitions of terms used in railway water service.

Complying With Federal Regulations in Regard to Purity of Drinking Water Supplied to Trains

The Public Health department now has seven cars fitted as traveling laboratories for checking the quality of water supplies, but these of late have been used mostly for military purposes. The establishment of additional headquarters for the various sanitary districts has also been delayed on account of the fact that many men trained in this work are now being engaged for work for the army.

The principal steps in advancement were the adoption of new standard methods of analysis, and an amendment to the regulations pertaining to drinking water supplies, requiring a certificate showing not only that the water conforms to the bacteriological standards as outlined in last year's report, but also that it is from a supply which is not exposed to contamination. This enlarges the scope of the regulations and assures a greater probability of a suitable water being furnished than could be expected under a semi-annual bacteriological test alone. The sanitary survey governs features in connection with the matter of water supply which in a great measure are susceptible to correction and control.

It is contemplated by the Public Health department to call a conference in the near future of the State Health authorities for the purpose of standardizing water inspections as well as to define the requirements in source and method of supply. If it is the pleasure of this Association, the committee will be pleased to report on the engi-

neering and maintenance matters of interest brought out at this meeting.

Relative Merits of Continuous and Intermittent Water Softeners

A survey of the field indicates that there are now in service on American railroads, approximately 550 water-softening plants, at which about 30,000,000,000 gal. of water are softened annually. In addition to this a large amount of water is partially treated in roadside tanks with soda ash alone, with no allowance for sedimentation. The total amount of water consumed annually for steam purposes by these railroads is approximately about 450,000,000,000 gal., or nearly 6.7 per cent. of the total water used for steam purposes is completely treated. The continuous type of plant seems to predominate, about 70 per cent. of the total number of plants installed being of that character.

As to the comparative economy of continuous and intermittent plants, the operating costs seem to be very nearly the same in well-designed plants of both types. The amounts of chemicals required should be the same in either type, although improper design in the agitating facilities of some types has been found to allow a part of the lime reagent to settle into the sludge before reaction has taken place. Investigation as to running repairs required indicates that these are so largely influenced by the design and location of the plant and the daily attention given to its operation that no general comparison of the two types can be made on this basis. The labor cost generally should also be the same, as with any type of treating plant in railroad service, the constant attention of a man is highly desirable and decidedly economical. There seems to be little difference in the fuel or power item, although conditions vary in different localities. The large variety of type of the many plants installed precludes a general comparison as to interest and depreciation.

The following are the general advantages of the two types:

Intermittent

1. The most advantageous arrangement for an intermittent plant consists of two settling tanks of road tank height, to serve alternately as treating and settling tanks. This arrangement provides duplicate tank facilities and increased the ratio of storage capacity to daily consumption.
2. The intermittent plant is of the most simple construction and its operation is readily understood by the low paid class of service usually engaged for this work.
3. The cost of maintenance of the type of intermittent plants generally in use is small, the necessary repairs simple, and the materials for making them readily available.
4. The uniformity of treatment is certain, large amounts of water being treated at a time, and the opportunity for error is slight.
5. The intermittent plant has no intricate or expensive parts to deteriorate, as are frequently present in some continuous types.
6. A portion of the old sludge remains in the tank and is mixed with the water on each addition of reagents. This acts as a foundation for the newly formed molecules of sludge, causing precipitation in larger particles, and thereby hastening the settling.

Continuous Type

1. In large plants, the continuous type can be designed to afford more economy in ground space.
2. It will handle a larger volume of consumption on a smaller rate of flow, since the action is continuous and there is no dead time for settling.
3. Where the pumping station is located at some distance from the delivery tank, some types of continuous plants adjacent to the point of delivery are advantageous.
4. At terminals, or where proper attention can be given to the plant at stated periods, attendance at continuous plants can be performed more readily by employes engaged primarily in other duties, but this brings uncertain results due to divided responsibility, and is, therefore, of doubtful advantage.
5. In a certain type of continuous plant, very thorough and gradual mixing is secured by introducing the water and reagents at the bottom of the mixing tank and keeping a portion of the old sludge continually agitated with the incoming mixture, thereby aiding reaction and sedimentation.

Rules for the Care of Boilers in Pumping Stations

Duties of Attendant: The pumper, station agent or other person in charge of the local water supply will be held responsible for the condition of the entire plant. His first duty will be to see that there is an ample supply of water available for locomotive use at all times. In case of trouble that affects the water supply he must wire the chief dispatcher as well as the water service foreman, stating fully the trouble and what is needed for repairs. He must make frequent inspections of all parts of the plant, make all repairs within his power and avoid sending for repair man except when absolutely necessary. He will be responsible for the safe-keeping and economical use of supplies furnished to the water station and place orders for fuel and supplies in ample time to avoid a shut-down of the plant.

Pumphouse: The attendant must keep the pumphouse neat and clean and take every precaution against loss or damage by fire. Waste or other combustible material must not be stored in the pumphouse. Oil and gasoline must be stored outside in proper receptacles. Cinders must not be dumped close enough to the house to endanger it. Proper places must be provided for all tools and they must be returned to their proper places after using.

Machinery: Machinery must be inspected daily and adjustments made to increase its efficiency and to prevent wear or breakdown. Particular attention must be given to the packing and lubrication of all parts. The attendant must be familiar with the location and purpose of all steam and water pipes, valves, levers, etc., so that in case of accident or leaks the valves controlling same may be properly used. When ordering repair parts for any piece of machinery the attendant must always give the name of manufacturer, shop number of the machine and repair number of the part wanted.

Boilers: Attendant must see that the boiler contains a sufficient amount of water before starting a fire and shall see that the gage-cocks, water glasses and safety valves are clean and in good condition. Fire must be cleaned frequently of clinkers. Ashes must not be allowed to accumulate beneath the grate. If muddy water is used, boilers must be blown down frequently. In doing this, boiler must be filled full of water and blown down to one gage with not over 30 lb. of steam. Foaming is due to a dirty boiler and can be stopped by blowing down and filling with fresh water. The boiler must be washed out once a week or oftener if, in the judgment of the water service foreman, it is necessary. Flues must be cleaned of ashes and soot frequently. If it develops, when the plant is operating, that no water appears in the water

glass the valve below the water column should be opened. If water then appears, the flow to the boiler can be increased; if not, fire must be pulled and boiler cooled before turning any water into the boiler. Where more than one shift is in charge of the pumping plant each oncoming man should be notified of any defects by the man leaving. Should the safety valve stick and steam gage show over-pressure, draft doors should be closed and boiler allowed to cool off to pressure at which valve is supposed to work before any repairs or adjustments of the safety valve is attempted.

Oil Engines: The attendant must be provided with a copy of and must be governed by the manufacturer's printed instructions for operating the particular type of engine in his charge. To secure economical and satisfactory operation, engines must be properly lubricated, the attendant must see that all moving parts are free from dirt, properly oiled and work easily. Lubricating oil must be fluid enough to be fed readily through the oiler. When the oiler is filled the lubricating oil should be run through a fine mesh strainer inserted in a funnel. The cover of the oiler should be in place at all times except when filling it. The oiler should be drained occasionally and washed out with gasoline. This applies also to the bearing oil cups. The machinery to be driven should be detached from the engine until the engine is in motion.

Before starting see that the tank contains fuel and that a supply of cooling water is available. Thermometers are frequently provided which show the temperature of the cooling water around the cylinder. When running the thermometer should register 140 to 180 deg. F. The most favorable temperature will be different with different fuels and the attendant should note the temperature at which the operation is best and attempt to keep it reasonably close to that figure. The temperature can be held at that point by regulating the supply of water to the cylinder jacket by means of the valve provided for that purpose. The pump, piping and water jacket of the engine must be drained when the engine is not in use to prevent freezing and cracking of the cylinder.

Fuel for an oil engine should be strained at the time the storage tank is filled. In some types of engines fuel is injected into the cylinder through a spray nozzle. Irregular operation may be caused by foreign matter in the oil sticking in the spray nozzle or in the check valve in the injector pump. The small hole in end of spray nozzle must be cleaned occasionally.

If a loss of compression is noticed, the piston should be inspected. The piston rings should be free in their grooves. If they stick, the compression or explosion will blow past them and the combustion will be poor, due to poor compression. Any accumulation of carbon which tends to stick to the rings should be washed out with gasoline.

Water Tanks: They should be filled at each pumping to prevent shrinkage of the wooden tanks, or deterioration in the sheets of metal tanks, as well as to safeguard the water supply in case of accident to the pumping plant. Tank spouts and grab ropes must be maintained at standard clearance. Defects in spouts, valves or discharge pipes must be reported at once. The attendant must watch engines take water and report unnecessary waste. Damage to fixtures or appliances by engines taking water must be reported to the water service foreman, giving date, train and engine number.

Water Columns or Stand Pipes: Water columns should be inspected frequently and maintained in good working order. Lifting rods should be tightened, leaky glands repacked and locks and rollers adjusted. On double track, water columns should be swung in the direction of traffic and locks maintained in such position that they hold the water column parallel to the track.

Electric Motor: The motor, control and pump should be inspected at least once each week, at which time the parts should be thoroughly cleaned and all contacts should be carefully inspected to see that they make and break at the proper time and that contact surfaces are clean. All wearing parts should be well lubricated and special attention should be given to the motor bearings. The building where the motor is located should be kept clean. No paper or oily waste should be allowed to collect in switch boxes or near a motor or any electrical contact or wires.

Waste must not be used around the commutator or brushes and gasoline or sandpaper must not be used to clean the commutator. If the motor sparks excessively the proper official should be notified.

The motor should be watched carefully for overheating. The commutator should not be allowed to become worn or grooved by the brushes.

Any displaced wiring must also be reported. No attachments should be made to the wiring as serious damage may be done to the equipment and there is danger of personal injury. A fuse must never be replaced with anything but a proper fuse. If one of a higher ampere rating is used it may cause serious damage to the motor. The fuse is the electrical safety valve and should no more be tampered with than a steam safety valve. A test lamp should be used to find blown fuses, thus avoiding chances of electric shocks. A gage should be supplied to each alternating current motor to test the space between motor and field poles. If gage will not pass freely the bearings need immediate attention.

On pump motors controlled from a distance, the remote control starter located in the pumphouse should be tested frequently to see that its starts the motor properly. It should be inspected frequently and any badly burned contacts reported.

Organization for Railway Water Service Department

Establishing a water department organization does not necessarily mean that the division forces are materially changed where water service men are locally employed,

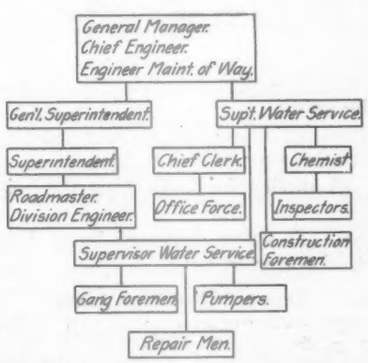


Diagram of Suggested Organization

but that the local officers and the engineering department are relieved of the duties incidental to the design and development of water facilities and the work placed in the hands of those trained along this particular line. That there is an urgent need for such an organization has been proved by the results obtained on roads that have established a department to handle this very important feature of railroad operation.

Inquiries as to the method of handling water supply were sent out to a number of railroads. Replies were

received from 38 railroads representing a mileage of 136,991. The total number of water stations was 7816. Of roads reporting seven have separate water departments, while on 20 roads the water supply is handled by the bridge and building department; on eight roads by the divisional water department, and on three roads jointly by the maintenance of way and motive power departments.

The graphical chart submitted herewith represents a complete water department organization and may be readily adapted to any road with such modifications as may be necessary for a road of greater or lesser mileage. For example, where there are no treating plants in service the work of making water analysis would probably come under the engineer of tests or outside chemists, rather than a department chemist.

The chart submitted represents the best practice in present water department organization on American railroads, and while it is not exactly typical of any particular water department organization, the committee feels that it embodies the best features of the existing water department organization.

Definitions of Terms Used in Railway Water Service

Group "A"—Wells

ARTESIAN WELL.—A flowing well from which the water is caused to rise above the surface of the ground by subterranean pressure.

DEEP WELL.—A well having a depth of 100 ft. or greater.

SHALLOW WELL.—A well less than 100 ft. in depth.

DRILLED WELL.—A well made by drilling or boring.

DRIVEN WELL.—A well constructed by driving the casing and then removing the material inside the casing.

DUG WELL.—A well made by digging or excavating.

WELL CASING.—A pipe forming the wall of a well.

WELL SCREEN.—A perforated device, usually a slotted or wire-wound pipe for the admission of water into and the exclusion of other matter from a well.

Group "B"—Water Tanks

TANK.—A basin or reservoir above ground for the storage of liquids.

TANK TOWER.—That portion of the tank structure between the tank and its foundation.

TANK VALVE.—The valve for delivery of water from the tank.

OUTLET PIPE.—The pipe for delivery of water from the tank to the spout.

TANK SPOUT.—An adjustable spout for delivery of water from the outlet pipe to the tender.

INDICATOR.—A device for indicating the height of water in tank.

FLOAT VALVE.—A valve operated by a float controlling the height of water in tank.

Group "C"—Pipe Lines

INTAKE LINE.—A line of pipe through which the water flows from the source of supply to the intake well.

SUCTION LINE.—A line of pipe through which water is drawn by suction to the pump.

DROP LINE.—A vertical line of pipe through which water is lifted out of a well.

DISCHARGE LINE.—A line of pipe from the discharge of pump to tank, or distribution system.

SERVICE LINES.—Lines of pipe through which the water is distributed.

Group "D"—Water Columns

WATER COLUMN.—An apparatus for delivering water into the tender at a distance from the tank.

Group "E"—Internal Combustion Engines

INTERNAL COMBUSTION ENGINE.—A prime mover in which the power is derived from the explosive force of the fuel, compressed and ignited in a cylinder, acting directly against a piston.

TWO-CYCLE ENGINE.—An internal combustion engine receiving a power impulse during each revolution.

FOUR-CYCLE ENGINE.—An internal combustion engine receiving a power impulse during each second revolution.

GASOLINE ENGINE.—An internal combustion engine using gasoline, naphtha or other volatile petroleum fuels.

GAS ENGINE.—An internal combustion engine using natural or manufactured gas as fuel.

OIL ENGINE.—An internal combustion engine that may be started and operated on a non-volatile oil of lower specific gravity than gasoline without passing the oil through a carburetor, mixing valve, or preheating the oil, in which the fuel is ignited by a bulb, tube or plate heated from previous combustion.

DIESEL ENGINE.—An oil engine in which the combustion is due to the heat generated by compression.

Group "F"—Water Treatment

UNTREATED WATER.—Water not subjected to treatment.

TREATED WATER.—Water subjected to treatment.

UNDERTREATED WATER.—Water to which insufficient chemicals has been added.

OVERTREATED WATER.—Water to which an excess of chemicals has been added.

INCRUSTING SOLIDS.—Matter in the water which forms scale on tubes and sheets of boilers.

NON-INCRUSTING SOLIDS.—Matter in the water which does not form scale.

SUSPENDED MATTER.—Matter in the water which may be removed by coagulation, sedimentation or filtration.

AERATION.—Bringing the water into intimate contact with air in order to introduce oxygen for the oxidation of iron or organic matter, and for washing out gases and volatile odors.

FILTRATION.—A process of passing water through layers of sand or other porous material for the removal of suspended matter or bacteria.

SETTLING TANK.—A reservoir in which water is retained for the sedimentation of suspended matter.

REAGENT.—A chemical used for the treatment of water.

HARDNESS.—The quality of water caused by dissolved incrusting solids or by acidity.

SLUDGE.—Resultant precipitant formed by sedimentation or by removal of incrusting solids in water treatment.

Group "G"—Pumps

PUMP.—An apparatus for raising or transferring water or other fluids.

RECIPROCATING PUMP.—One in which the piston or plunger alternately draws the water in and discharges it from the cylinder.

SINGLE ACTING PUMP.—One in which one end of the plunger only acts on the fluid column.

DOUBLE ACTING PUMP.—One in which the plunger acts upon the fluid column both upon the forward and return stroke.

PISTON PUMP.—One in which a finished cylinder is closely fitted with a reciprocating piston.

PLUNGER PUMP.—One in which the reciprocating part is a solid plunger which does not come in contact with the cylinder walls, but enters the cylinder through packing glands.

DIRECT ACTING PUMP.—One in which the piston is reserved by an impulse derived from itself at or near the end of each stroke.

ROTARY PUMP.—One in which two revolving pistons rotate in a pump case which they completely fill; the pistons alternately draw in and discharge the water.

CENTRIFUGAL PUMP.—One in which the pressure necessary to raise the water is derived from the velocity of a revolving impeller.

AIR LIFT.—An apparatus for introducing compressed air into a well and thereby raising water out of the well.

Conclusions

The committee requested the following action on its report:

1. That the changes in the subject-matter on Water Service under the heading, "Revision of Manual," be adopted and substituted for the matter now given in the Manual.
2. That the report on methods for complying with Federal Regulations in regard to purity of drinking water supplied to trains be received as information.
3. That the subject of the design of impounding reservoirs be reassigned to the committee for completion during the coming year.
4. That the report on the relative merits of continuous and intermittent water softeners be received as information.
5. That the report on rules and examination questions for the care of pumping stations be adopted by the Association and inserted in the Manual.
6. That the report on organization for railway water service departments be received as information.
7. That the definitions of terms be adopted by the Association and inserted in the Manual.
8. That Subject No. 8, on suitable types for water meters for use in rail water service, be reassigned to the committee for study and completion during the coming year.

Suggested Subjects for Next Year's Study and Report

1. Make a final report on the design of impounding reservoirs and conditions under which they are economical.
2. Make a final report on suitable types of water meters for use in railway water service, methods followed in testing and reading meters, and checking the consumption of city water.
3. Continue the study of methods for complying with Federal regulations in regard to the purity of drinking water supplied to the public and employes on interstate trains.
4. Submit plans and recommendations for typical water station layouts.
5. Make a study of prevalent locomotive flue failures alleged to be due to improper water conditions and suggest remedies.
6. Revision of the Manual.

Committee: A. F. Dorley (M. P.), chairman; J. L. Campbell (E. P. & S. W.), vice-chairman; J. T. Andrews (B. & O.), C. A. Ashbaugh (G. C. & S. F.), R. C. Bardwell (M. P.), F. T. Beckett (C. R. I. & P.), E. H. Brown (N. P.), C. Bucholtz (Erie), C. C. Cook (B. & O.), R. H. Gaines (K. C. S.), E. M. Grime (N. P.), W. C. Harvey (C. G. W.), C. R. Knowles (I. C.), E. G. Lane (B. & O.), J. D. Mathews (S. P.), W. A. Murray (N. Y. C.), E. H. Olsen (A. T. & S. F.), W. A. Parker (St. J. & G. I.), H. N. Rodenbaugh (Southern).

Discussion

A. F. Dorley (Chairman): Subject I was placed in the charge of a sub-committee, of which Mr. Campbell was chairman. In two articles the committee recommends some decided changes in the essence of the subject matter in the Manual, but the other revisions consist of changes or improvements in the diction only, and involve only minor changes in the recommended practice. The Manual now reads: "The greatest disadvantage in treating water is the increased tendency to foam, due to the reaction of soda ash on the sulphate of lime and magnesia."

When the treatment of water on the railroads was first undertaken all those who engaged in it acted very cautiously, and the treatment was usually limited to the point where foaming would not occur, but gradually roads began to complete the treatment to the point where all the suspended matter or the incrusting solids were removed, and they have found that by a proper education of the engine men in the handling of waters that are inclined to foam that with a judicious use of anti-foaming compound water can be handled, even though it is treated, irrespective of the foaming content or foaming solids. This article just quoted from the Manual is frequently used as an adverse argument by those who are not friendly disposed to water treatment. I move that this article be omitted from the Manual.

The President: If there is no objection the omission of this latter is approved.

Mr. Dorley: Under the head of "Foaming and Priming," the following occurs in the Manual: "Foaming from treated water is due to the presence of sodium salts, as a result of treatment for incrusting sulphates, together with such quantities of the alkali salts which may have been present in the raw water. This condition is aggravated by and to a large extent due to the presence of suspended matter in the water.

"Concentration of foaming solids in locomotive boilers reaches the critical point at about 100 grains per gallon. Concentration above this point must be avoided by changing the water, or else trouble from foaming will be experienced." The committee suggests that this paragraph be made to read:

"Concentration of foaming solids in locomotive boilers reaches the critical point between 100 and 200 grains per gallon, depending upon the character of the foaming solids and the amount of suspended matter in the water. To prevent foaming, the concentration must be kept below that point."

That means in any particular water, which has a fixed critical point—which may be anywhere from 100 to 200, for that particular water its concentration must be kept below its concentration point.

I move that this change be adopted.

The President: If there is no objection, the suggested revision will stand approved. It is so approved.

Mr. Dorley: We report on subject No. 2, "Methods for Complying with Federal Regulations in Regard to Purity of Drinking Water Supplied to Trains." This subject has been watched, and progress reports are being made by R. C. Bardwell, the chairman of the subcommittee.

On Subject 3, "Make Final Report on Design of Impounding Reservoirs, and Conditions Under Which They Are Economical," the committee reports progress.

The report on subject 4, "Relative Merits of Continuous and Intermittent Water Softeners." After a railway has decided to go into the problem of water purification, either on a district or at any particular point, the most important thing to decide is the question of the type of softener. As a rule, when railways begin water purification they have not any well developed plans of their own and they naturally turn to the manufacturers of water softeners for advice and help. Then the deciding

factor is frequently one of price. Each type has its own particular merits which fits it and makes it suitable for particular conditions, and this report is offered with the hope that it may be of some service to railroads who are about to install water softeners. This part of the report is offered as information only.

Subject 5: "Rules or Examination Questions for Care of Boilers in Pumping Stations." We would like to offer for your consideration and for insertion in the Manual the subject matter coming under the sub-head, "Duties of Attendant." (This was accepted without comment. Mr. Dorley then offered some corrections to the proposed "Rules or Examination Questions for Care of Boilers in Pumping Stations," after which the report was approved for insertion in the Manual.)

Mr. Dorley: In handling the report on subject 6, the sub-committee sent out inquiries to quite a number of roads to ascertain just what organization the water department had, and they found that the practice with reference to the care of water service varies more widely on American railroads than perhaps any other branch of the service, and the committee submits a chart showing a typical organization that, with some modifications, we believe can be made to fit into the existing organization of practically any road. There are a few large roads that have a distinct water department and the results secured on these roads prompts the committee to recommend that some such line-up of organization be considered on other railroads. This report is offered to the Association as information only for the time being.

On subject 7, "The Definitions of Terms Used in Railway Water Service," are offered for insertion in the Manual.

A. N. Talbot (U. of Ill.): With reference to the first definition, "Artesian Well," I call attention to the fact that this is the old definition of artesian well, a flowing well, but in modern practice we include in the term "artesian well" any well in which the water rises a considerable distance above the level of the stratum from which it comes. It need not be a flowing well. The Association will be going against what is pretty well established practice if this definition is adopted.

C. E. Lindsay (N. Y. C.): Under the rules we are not allowed to discuss definitions on the floor of the convention, and, therefore, under these circumstances we are forced into the position of taking these definitions as they are, or rejecting them. We have, however, a good precedent in the case of the report of the Committee on Buildings, which submitted its report with the distinct understanding that the definitions would be open for discussion for a year, and I think it is a good course to pursue.

The President: I think Mr. Lindsay's position is correct, and I am personally of the opinion that the Association will yet get to the point where the materials that go into the Manual will be subject to letter ballot. The committee says that it will be able to take this matter up for another year if the members will really give them suggestions so that the report can be put in shape so that it can be adopted next year. It will also take into consideration Prof. Talbot's definition of artesian wells, or rather his comment regarding them.

(This matter will be postponed one year, and will be reported then with corrections.)

Mr. Dorley: Appendix G is headed, "Pollution of Wells from Overlying or Adjacent Cinder Deposits." It is generally known that the deposits of cinders such as we have around railroad terminals add a perceptible pollution to water they come in contact with, but it has not generally been known that the effects of cinder deposits would be as far reaching as they were found to be in East St. Louis, where the overlying cinder deposits in yards were found to be a very perceptible contamination to underlying ground waters.

(The committee was dismissed with the thanks of the Association.)

Report on Records and Accounts

THE COMMITTEE has no specific recommendations to make for changes in the Manual, but submits a brief discussion on the standardization of forms and stationery. The committee desires to call attention to the desirability of reducing the number of forms used in the maintenance of way department in the interest of economy and efficiency. As an illustration may be cited the experience of an official of a large railway system, who, after making a careful analysis of the different blank forms used in the several departments, reduced the number from 1500 to 500. This large decrease not only involved a great saving to the railroad in clerk hire and for stenographers, but it also relieved the different officials from the unnecessary labor of examining and considering the mass of details from which no adequate results would be obtained.

Another feature to which the committee would call attention is the need for standardizing the sizes of forms, stationery, specifications, drawings, etc. There is no good reason why one railroad should use a letterhead of an odd size, like 8 by 10 in., or one of 7¾ by 12 in., or other odd dimensions. The standard size letterhead is 8½ by 11 in., which cuts from a sheet 17 by 22 in. without waste. Anything differing from that size is considered a "special," and consequently costs more money.

Specifications are also made of all sizes for no apparent reason except precedent. If specifications were uniformly written or printed on standard size sheets, it would effect a material saving and would fit in any ordinary letter file. The same argument applies to all sorts of drawings, which it would be an advantage to produce on letterhead-size sheets. The use of large sheets for drawings, except in special cases, has been discontinued in many engineering offices, the drafting now being done on letter-size paper. Instead of tracing cloth, cross-ruled thin paper from which blueprints can be made is recommended.

On pp. 759-768 of Vol. 18 of the Proceedings for 1917, the committee submitted specifications for maps and profiles, which were received as information at the last annual convention. These specifications have now been before the members for one year, but no comments or criticism have been received by the committee during the year. The committee therefore submits these specifications for maps and profiles for approval and publication in the Manual.

In response to a circular addressed to valuation engineers of railroads represented in the Association, the committee obtained a large amount of most valuable information regarding valuation forms for both field and office use. This data has been carefully studied by the committee, and after due consideration it has been decided not to recommend any additional valuation forms at this time. One reason for this conclusion is that the subject was quite fully covered in the last annual report of the committee, consisting of a large number of typical valuation forms; an additional reason is the difficulty of devising forms to cover the great variation of local conditions existing in different sections of the country. It is therefore the suggestion of the committee that the various forms collected by it be placed on file in the office of the Association for inspection and use of anyone interested.

The committee has interpreted the assignment of the subject of additional definitions to mean definitions covering valuation matters, and in accordance with that understanding it is preparing a series of definitions pertaining to valuation of railroads, but is not prepared to submit them with this report, preferring to give more consideration to the proposed glossary of terms.

The committee has gathered some data to aid it in making a report regarding various maintenance of way department forms, but owing to the unusual conditions prevailing during the past year, it has not been feasible to make a report. The information collected is being made use of in studying the matter, and it is hoped to present something to the Association at its next annual meeting that will be of value.

The committee recommended that all subjects assigned it last year, with the exception of one regarding the various methods of reproducing maps and profiles on tracing linen for permanent record, be again referred to it for the current year.

Committee: W. A. Christian (I. C. C.), chairman; M. C. Byers (W. M.), vice-chairman; F. L. Beal (L. & A.), Lester Bernstein (B. & O.), H. Bortin (C. R. R. of N. J.), W. S. Danes (Wabash), J. W. Fox (C. of Ga.), B. B. Harris, Geo. D. Hill (N. Y. C.), G. T. Kuntz (N. P.), Henry Lehn (N. Y. C.), J. H. Milburn (B. & O.), J. C. Patterson (Erie), J. H. Reinholdt (M. & St. L.), R. C. Sattley (C. R. I. & P.), Huntington Smith (N. Y. C. & St. L.), H. M. Stout (N. P.), W. D. Wiggins (P. L. W.).

Discussion

Mr. Christian (Chairman): Your committee submits a short report. Twelve subjects were assigned to this committee, and the sub-committees are not in position to submit anything to the convention for approval and publication in the Manual, with the exception of subject 6: "Submit Specifications for Maps and Profiles, Co-ordinating Them with Previous Work of the Association."

We submit number 6 for approval by the convention.

The President: These specifications were held over for a year to give the members an opportunity to study them. The chairman says that they have received very little comment upon them from the railroads. It appears to me that it would be no more than just to the committee that definite action be taken at this time.

Mr. Christian: I move that the specifications as published in Volume 18, Proceedings of 1917, for maps and profiles be accepted and published in the Manual.

J. L. Campbell (E. L. S. W.): I would like to ask the committee in this connection if there will be no conflict recommended between the requirements of Map Order No. 1, of the Division of Valuation, and the specifications.

Mr. Christian: Map Order No. 1 was considered and the specifications include a large portion of that order.

W. C. Cushing (P. L. S. W. S.): That is the reason that we do not want to accept, as far as our road is concerned, these recommendations. We do find in examination of the specifications that they do conform to the Map Order of the Bureau of Valuation, and we find the sizes specified in that map order are not suitable for our records.

Mr. Christian: In reply to Mr. Cushing's objection, I wish to state that one thing that the committee tried to secure in the specifications for the maps and profiles was to determine a size that would be generally acceptable, so that all maps and profiles would be the same size. As it is now every road has a different size. The committee would like to see the sizes as specified in these specifications used.

The President: A motion has been made and seconded that these specifications as published in the proceedings of 1917 from Pp. 759 to and including part of 768 be printed in the Manual. (The motion was carried.)

Mr. Christian: I would like to refer to the subject of formulating methods for reproducing maps and profiles on tracing linen for permanent records. In the proceedings of Volume 17, of the convention held in 1916, the committee presented such data as it was able to accumulate at that time on this subject, and there has been no new development in this matter, which the committee has been able to ascertain, and it suggests that this subject be discontinued. I move that Subject No. 4 be omitted from further consideration.

The President: That will be in the hands of the Committee on Outline of Work.

Mr. Christian: On page 211 there is an appendix A entitled, "Revision of Manual."

As an illustration of the matter treated in this appendix, one official after taking office with an eastern carrier, asked to have one of each kind of forms used submitted to him for his inspection, and after doing so he cut them down from 1,600 to 500 or 600. This reduction was a saving, not only in paper, printing, labor and time, but it facilitated the work of the various departments, and that was a very good thing. We do not submit this in the form of a motion, but we call attention to the fact that there are a great many odd sizes of maps, drawings, statements, etc., used by the carriers nowadays that we could well do away with.

The President: Will the Committee on Outline of Work bear that in mind.

Mr. Lindsay: For information, I would like to ask if that Sheet 17 x 22 is the generally recognized trade size?

Mr. Christian: It is the generally recognized trade size.

Mr. Cushing: On reading this recommendation of the committee I took it up with the purchasing agent of our line because of the fact we use 8 x 10½ sheets, standard size, and pointed out to him that he was wasting money by using that size, but he informed me that I was entirely wrong, that he was saving money, because we were such large consumers of paper there was no difficulty in obtaining the size required to produce 8 x 10½.

It occurs to me that all that is necessary will be for the railroads to unite on a standard size, and the manufacturers will make it, and that will become the trade size. There is certainly less paper made 8 x 10½ than 8 x 11, and if we do not need that extra half-inch for our correspondence, we had better adopt the smaller size.

The President: The suggestion of Mr. Cushing seems to be a pertinent one, and I presume that the Committee on Outline of Work will take it up. The committee was dismissed with the thanks of the association.

Members of A. R. E. A. Committees in Military Service

Lieut-Col. H. J. Slifer	Major F. L. C. Bond	Major C. S. Coe	Major Azel Ames
Major Henry Stephens	Major P. M. La Bach	Major F. E. Lamphere	Major W. L. Webb
Major E. C. Schmidt	Major T. E. Rust	Capt. F. W. Green	Capt. C. W. Cochran
Capt. W. G. Arn	Capt. H. Austill	Capt. W. M. Vandersluis	Lieut J. S. Bassett

The Railway Engineering Association and the War

Over One Hundred A. R. E. A. Men With Colors—Many Prominent Members Now Commissioned Army Officers

MODERN WARFARE HAS developed into a keen engineering struggle demanding the highest grade of scientific skill and ability. It is not surprising, therefore, that many of the leading members of the engineering profession in this country have been called upon to assist our country in its great struggle against ruthless autocracy. The secretary of the American Railway Engineering Association reports that 103 members are now with the colors and many of these hold most important positions in the forces engaged in the prosecution of the war.

S. M. Felton, president of the Chicago Great Western, is now director-general of military railways in charge of the organization and equipment of railway regiments for service on the French railroads serving the American front. Mr. Felton has supervised the recruiting of 11 regiments of railway men which are now at work on the the other side and is preparing new units for movement to France as rapidly as is practicable. In addition he organized and despatched a corps of railroad officers to Asiatic Russia for the purpose of rehabilitating the Trans-Siberian railroad. A. R. E. A. members are well represented on the regiments so far organized, holding many of the most important commissions. F. G. Jonah, formerly chief engineer of the St. Louis & San Francisco, is now major of the 12th Engineers (Rys.); Charles L. Whiting, formerly division superintendent of the Chicago, Milwaukee & St. Paul at Lewistown, Mont., is major of the second battalion of the 13th Engineers (Rys.); Benjamin W. Guppy, formerly engineer of structures of the Boston & Maine at Boston, Mass., is major of the first battalion of the 14th Engineers (Rys.); Geo. H. Webb, formerly chief engineer of the Michigan Central, is lieut.-colonel, 16th Engineers (Rys.); W. G. Atwood, formerly assistant district engineer, division of valuation, of the Interstate Commerce Commission at Chattanooga, Tenn., is major, 17th Engineers (Rys.); E. B. Cushing, assistant general manager of the Southern Pacific lines, Houston, Tex., is major, 17th Engineers (Rys.). W. J. Wilgus, formerly vice-president of the New York Central, is now a colonel attached to the railway units and recently returned from France, where he has been serving on the military railroads, to co-operate with Director-General Felton in supervising the enlistment of men for additional railway regiments.

A. R. E. A. committees are particularly well represented in the army with one lieut.-colonel, nine majors, eight captains, and one first lieutenant. H. J. Slifer, formerly consulting engineer at Chicago and a member of the committee on the Economics of Railway Labor, is now a lieutenant-colonel of the Twenty-first Engineers (Light Railways) in service in France. Azel Ames, formerly connected with the Kerite Insulated Wire & Cable Company and also consulting signal engineer at New York, is a major in the 61st Regiment Coast Artillery at Fort Screven, Savannah, Ga. Major Ames is a member of the committee on Signals and Interlocking. F. C. L. Bond, formerly division engineer of the Grand Trunk at Montreal, Que., and a member of the committee on Wood Preservation, is now a major assigned to Company C, 10th Battalion of the Canadian railway troops now in France. C. S. Coe, formerly engineer maintenance of way of the Florida East Coast at St. Augustine, Fla., and a member of the committee on Masonry, is now major with the 17th Engineers (Railways) in France. Paul M. LaBach, until recently assistant engineer of the Rock Island Lines at Chicago, and a member of the committees on Economics of Railway Location and Stresses in Track, has been made mechanical and water supply engineer of military railroads in France with the rank of major. F. E. Lamphere, formerly assistant engineer of the Baltimore & Ohio Chicago Terminal and a member of the committee on Yards and Terminals, is now a major in the Quartermasters' Officers' Reserve, with headquarters at Port Newark Terminal, Newark, N. J.

T. E. Rust, until recently chief engineer of the Waterloo, Cedar Falls & Northern, Waterloo, Iowa, and a member of the committee on Signs, Fences and Crossings, is now a major in the Engineer Officers' Reserve Corps, with headquarters at Camp Lee, Va. E. C. Schmidt, professor of railway engineering at the University of Illinois, Urbana, Ill., is now a major in the conservation division of the United States Fuel Administration at Washington, where he has charge of the organization of work in connection with fuel conservation on the railroads. Major Schmidt is a member of the committees on the Economics of Railway Location and the Economics of Railway Operation. W. L. Webb, formerly public utility engineer at Philadelphia, Pa., and a member of the committee on the Economics of Railway Location, is now in France as a major with the U. S. Regular Engineers. Henry Stephens, formerly supervisor of materials of the New York Central Lines at Cleveland, Ohio, and a member of the committee on Wood Preservation, is a major with the 65th Engineers at Camp Meade, Md.

The eight committee members who now hold commissions as captains are as follows: W. G. Arn, formerly assistant engineer maintenance of way of the Illinois Central at Chicago, and a member of the committee on Yards and Terminals, 13th Engineers (Railways), France; H. Austill, formerly bridge engineer of the Mobile & Ohio at Mobile, Ala., and on the committee on Wooden Bridges and Trestles, 501st Battalion of Engineers, France; C. W. Cochran, formerly engineer maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis, and on the committee on Roadway, 32d Regular Engineers, Camp Grant, Rockford, Ill.; T. W. Fatherson, formerly engineer maintenance of way of the Chicago Great Western, Des Moines, Iowa, committee on Ballast, attached to headquarters 13th Engineers (Railways), France; F. W. Green, formerly assistant to the president of the St. Louis Southwestern, St. Louis, Mo., and chairman of the committee on the Economics of Railway Operation, acting superintendent of army transport service at one of the important ports in France. J. de N. Macomb, Jr., formerly office engineer Atchison, Topeka & Santa Fe at Chicago, and a member of the committee on Economics of Railway Operation, Engineers Officers' Reserve Corps; W. M. Vandersluis, formerly signal engineer of the Illinois Central, Chicago, and a member of the committee on Signals and Interlocking, Engineer Officers' Reserve Corps, Fort Leavenworth, Kan.; W. K. Walker, formerly engineer maintenance of way of the Wabash, St. Louis,

Mo., committee on Ballast, Engineer Reserve Officers' Training Camp, Camp Lee, Va. Jerome S. Bassett, formerly assistant engineer of the Missouri Pacific, Monroe, La., and a member of the committee on Ballast, is now a first lieutenant detailed as instructor at the Third Officers' Training Camp, Leon Springs, Tex. R. C. White, superintendent of the Missouri Pacific at Wynne, Ark., and a member of the committee on Ballast, was chief engineer and first assistant to the constructing quartermaster on cantonment construction at Camp Pike, Little Rock, Ark., last summer.

Other members of the American Railway Engineering Association who have recently received important commissions in new railway units are R. K. Rochester, superintendent of the Northwest System of the Pennsylvania Lines, who will serve as a general superintendent on the American-operated lines in France with the rank of major, and H. M. Waite, formerly manager of the city of Dayton, Ohio, who has been commissioned lieutenant-colonel.

The first member of the association who has died in military service, according to the best information at hand, is Captain L. B. Manspeaker, who passed away following an attack of pneumonia on February 9, at Camp Lee, Va.

The great importance of the expeditious movement of troops and supplies from various sections of this country to the seaboard and across the water is a problem now receiving the attention of the best brains and ability in the railway world. In this field, also, members of the American Railway Engineering Association have been and are prominent. R. H. Aishton, president of the Chicago & Northwestern, is now regional director of western railroads, with headquarters at Chicago. L. W. Baldwin, vice-president and general manager of the Central of Georgia, is now operating assistant to the regional director of southern railroads, with headquarters at Atlanta, Ga. Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford, and Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific Lines, were members of the Railroads' War Board which controlled the operation of the lines in this country until the government assumed their administration last December.

But for lack of space the activities of many other members of the association in connection with the prosecution of the war might be mentioned, but suffice it to say, all, whether in active military service or still in civilian life, are doing their utmost to ensure a decisive victory over Prussan militarism.

Provocation Enough

On a slow train in Arkansas sat a native, going up to Little Rock to testify in a shooting case. A deputy sheriff got aboard at a way station convoying an excited-looking person whose wrists were heavily manacled. Prisoner and warder took a seat directly in front of the countryman.

Presently, when his curiosity had mastered him, the first traveler bent forward and tapped the deputy on the shoulder.

"Whut's the trouble with the feller you got along with you?" he inquired in a whisper.

"He's got bugs," stated the deputy succinctly.

"He's got which?" inquired the yokel in a startled voice.

"He's buggy!" The deputy tapped his forehead meaningly. "He's crazy! Understand?"

"Bugs in his head, and his hands tied?" said the countryman. "Well, no wonder he's crazy!"

The New Committee Chairmen

OF THE 22 REGULAR and 2 special committees of the American Railway Engineering Association, 7 are headed by new chairmen this year, including the two new regular committees, Nos. 21 and 22, on Economics of Railway Operation, and Economics of Railway Labor.

F. R. Layng owes his position as head of the Tie committee to his long and active service with that body, of which he was vice-chairman for two years and has been a chairman of a sub-committee for several years. As engineer of track on the Bessemer & Lake Erie, the road with the heaviest ton mileage per mile of main track of any railway in the United States, he commands distinction as being in charge of tracks containing more steel ties than are to be found on any other line. In fact, he has been largely responsible for the development of these ties in actual service. This has made him of special value in connection with the work of the subcommittee on substitute ties. Mr. Layng is a close and critical student, who develops an unbounded enthusiasm for any subject he investigates. One of his hobbies, if it may be called such, is the care of laborers. He has been a pioneer in the movement for better living and working conditions for maintenance of way employees.

Joseph Mullen is a good man for the head of the Committee No. 12 on Rules and Organization, because he is himself a good organizer. Having been occupied until recently chiefly with construction projects, his friends say the success which has attended his various assignments are the result of his ability to build up an efficient and loyal organization, coupled with a faculty for sticking to a thing until he sees it through. A large part of his railway experience has been with the Cleveland, Cincinnati, Chicago & St. Louis, principally on construction work.

O. E. Selby, chairman of commmittee No. 15 of Iron and Steel Structures, is another Big Four man. While he bears the title of principal assistant engineer, he is essentially a bridge engineer, having carried that title for many years. Like all true bridge engineers, he is a man of technical attainment, a close student who must be thoroughly satisfied with his conclusions before he will commit himself. Given to scientific investigation, he has presented a number of valuable monographs both to this association and the American Society of Civil Engineers. He is primarily interested in bridge work in its various ramifications, but has also spent considerable time in studies of the mechanics of track.

Committee No. 16 on Economics of Railway Location has experienced some rather turbulent times during the last two or three years, as a result of which its reports at recent conventions have been marked by brevity and have been not infrequently supplemented by emphatic minority reports. In the light of this experience it is a curious fact that, under the leadership of a new chairman, R. N. Begien, it has presented no report at all. Be that as it may, the new head of the committee is eminently fitted for the position. At present general manager and formerly chief engineer of the Baltimore & Ohio and previously occupying various other engineering and operating positions with that road, he has been wont to view engineering problems from the operating standpoint, while using engineering knowledge in the solution of operating problems. He has been an active member of this committee and has contributed several valuable reports on special investigations conducted under his direction, among which may be mentioned

Dynommeter Tests on the Baltimore & Ohio, appearing in Volume 14 of the Proceedings.

E. B. Katte, the new chairman of committee No. 18 on Electricity, is well known because of his connection with the electrification of the New York Central lines into New York City. The fact that he succeeds Geo. W. Kittredge, chief engineer of the New York Central, would seem to give some ground for the impression that the New York Central had a monopoly on chairmanships of this committee, particularly since there is still other

New Committee Chairmen

F. W. Green **F. R. Layng** **R. N. Begien**
E. B. Katte **E. R. Lewis** **O. E. Selby**

good N. Y. C. timber in its personnel which will be available when Mr. Katte sees fit to give up the chairmanship. Mr. Katte comes from an engineering family. His father, the late Walter Katte, was chief engineer of the New York Central and Hudson River Railroad for 13 years and was known to engineers of the middle west as one of the founders of the Western Society of Engineers. Edwin B. Katte has been a hard-working member of the Electricity committee for a number of years, and it should make material progress under his leadership.

The new committee on Economics of Railway Operation was headed appropriately by an operating man, F. W. Green, assistant to the president of the St. Louis Southwestern, but he had hardly entered upon his new duties with this committee before the call of his country led him to join the Twelfth Engineers as a captain. It is understood that Captain Green has since been detached from his company and is at present acting superintendent in army transport service at one of the important ports in France. Although the son of a railway officer and an engineer by training, Captain Green commenced his railway career as a laborer with the Rock Island, working up through various positions in the operating department to the post he gave up to enter the service of the government.

The fundamental importance of the labor problem confronting the railways during the past year which promises even graver consequences during the coming season, made it eminently fitting that the Board of Direction should provide for a new committee on the Economics of Railway Labor, and the wisdom of the directors in the appointment of E. R. Lewis as chairman, is no less certain. Mr. Lewis is probably as well known as a writer on railway subjects as through his position as assistant to the general manager of the Duluth, South Shore & Atlantic. Commencing his railway career as a rodman on the Missouri Pacific in 1885, his experience

has carried him to most of the states in middle west and southwest, with two years on United States government work on the Mississippi river and six years on the Cape Government railways of South Africa. From 1906 to 1912 he was a division engineer on the northern lines of the Michigan Central and since that time he has been largely occupied in fighting the rigorous winters of upper Wisconsin and Michigan.

Annual Meeting of Appliances Association

President Bell's Address. M. J. Trees Elected President, P. C. Jacobs, Vice-President. Good Exhibit Showing

The tenth annual meeting of the National Railway Appliances Association was held in the Coliseum at 11 o'clock yesterday morning. E. H. Bell, president of the association, presided. In his address Mr. Bell said in part:

President Bell's Address

"Your directors and officers have had to meet many unusual and difficult problems in connection with carrying on the work of your association during the past year. We feel that our decision to hold our exhibition this year has been more than justified.

"It is unnecessary for me to recite the obvious uncertainty existing in all lines of commercial endeavor throughout our country during the past year.

"The industries of our exhibitors and members, representing devices and material used in the maintenance and construction of railroads, can only be considered as an extremely important factor in aiding our government in the prosecution of the war. We contribute to the efficiency and economy of the great transportation systems of this country. My conclusion, therefore, is that there is no reason to apologize for being here today, for, if we served a good purpose in pre-war times, we certainly can be of great service now.

"Our treasurer will give you his detail report on finances. However, I wish to say that during these uncertain times we should, in my opinion, feel grateful to our past officers and directors, who have, in years gone by, gradually built up and handed down to us a cash surplus which has placed us in a position where we can feel that our association could operate under adverse conditions for some time without financial embarrassment. In my opinion this surplus should be maintained.

"I have mentioned that we had a cash surplus, and, when the second issue of Liberty Loan bonds, bearing 4 per cent per annum, was announced, your board of directors voted that it was not only advisable, but patriotic, for our association to invest in some of these bonds. Therefore, $2,000.00 of these bonds were purchased.

"This year, in order to improve the harmony in color and to give a general lighter effect in the Coliseum, we changed the color of the fence from black to a gold bronze and repainted the bodies of the upright posts to harmonize. I believe that you will agree that the effect is pleasing. All of the flags decorating the ceiling are new. You will see that the balcony has been hidden by a bunting decoration. The same general scheme has been carried out in the annex, as we found that last year's decorations could not be materially improved upon.

"The attendance for the 1917 Exhibition was as follows:

Monday	3,442
Tuesday	5,907
Wednesday	7,509
Thursday	5,494
Total	22,352

"Many of us do not come into close contact with, and cannot, therefore, full appreciate the enormous amount of detail work necessary in carrying on the work of this association in efficiently preparing for the annual exhibition. Everything you need from the time your exhibit reaches the front door of the Coliseum is furnished you by your association or by reliable concerns who are responsible to your association for their work, and I feel that it is only fair to lay stress on the fact that your Director of Exhibits, Mr. Kelly, is entitled not only to the credit, but the thanks of this association for his most efficient work.

"I wish also to express my great appreciation to the board of directors and the executive board for their cooperation in handling the work of this association during the past year.

"I take this occasion to thank the enrollment committee under the direction of Mr. Kuerst of the Detroit Graphite Company for the efficient results they have accomplished."

Treasurer's Report

Secretary-Treasurer Kelly, in his report as treasurer, made the following report:

Cash on hand May 1, 1917, after charging for 1917 exhibit bills paid in 1918			$15,752.75
Receipts for 1918 business:			
From memberships	$ 4,727.50		
From space rentals	24,982.31		
From interest on deposits	496.20		
	$30,206.01		
Estimated additional receipts	860.43		$31,066.44
(This income is an increase over 1917 of $2,405.27.)			
Expenditures for 1918 business:			
General supervision	$ 1,050.06		
Estimated additional	324.18	1,374.24	
Administration	6,205.76		
Estimated additional	446.67	6,652.43	
Exhibition	7,796.53		
Estimated additional	11,856.92	19,653.45	
Total estimated expenditures			$27,680.12
(Which is $3,955.23 over 1917.)			$ 3,386.32

Would advise that the cash balance on hand of the Association up to and including March 16, 1918, is as follows:

Certificates of deposit in National City Bank	$27,000.00
Liberty Loan	2,000.00
Accrued interest on above	406.67
Cash in hands of treasurer	600.00
Checking account, National City Bank	879.24
Total	$30,885.91

Secretary's Report

In his report as secretary, Mr. Kelly said:

"Applications for membership and space were sent out as usual, accompanied by bulletin No. 10 and floor plan. The meeting of the board of directors for the assignment of space was held on November 12, 1917, with the result that the entire official floor space plan was filled with the exception of ten spaces, even though our floor plan arrangement affords us 31 more spaces this year than last, there having been 236 last year against 267 this year.

"Of the 267 spaces, 209 are occupied today by 119 of our 1917 exhibitors and 36 by new exhibitors, making a total number of exhibitors this year, 155.

"The annual invitations and passes were all prepared and ready for mailing, but owing to unsettled conditions were withheld until February 15, at which time 12,800 were mailed to a well selected list of railroad men, from presidents to roadmasters, on steam and electric lines; also to members of the American Railway Engineering Association, the Signal Association, Interstate Commerce Commission Engineering, staff of technical colleges and to many of the well-known railway contracting concerns. To these invitations we received acknowledgements equal to any former year, and requests for passes were in excess of former years. As a matter of fact, requests for passes have been larger in proportion from the railway people this year than from the supply concerns.

"We have taken great pains this year to thoroughly cleanse and prepare the dining room, and feel that we can personally guarantee the character of the supplies and foodstuffs to the extent that we would like to ask that as much as possible you patronize the cafe, so that we may keep the people in the building rather than invite them to some downtown restaurant which takes them away from our exhibits, which we have been planning for the last twelve months for their entertainment.

"I feel that the proposition of work orders is one which should be given some attention at this time and would like to ask the co-operation of each of our exhibitors to the extent that they help the work order cashier check up the work orders and get the accounts paid as quickly as possible so that we may have all our accounts in a good, clear manner at the earliest possible moment.

"The exit passes will be used this year the same as before, and will be issued to the exhibitor at the work order office by the cashier when paying the final bills.

"Kindly see that all parcels which you expect to take from the building are placed on your exit pass, as this will be your receipt to the association for the return of your exhibit.

"We will arrange to have bills of lading, both of freight and express for your convenience in shipping your exhibit from the Coliseum. The bills of lading and freight office will be in charge of Mr. Wertz of the Taft Cartage Company, who may be found at the secretary's office immediately after the close of our exhibition."

Election of Officers

The nominating committee, of which F. A. Poor was chairman, reported the following nominations for officers, and the nominees were unanimously elected:

President, Merle J. Trees, Chicago Bridge & Iron Works, Chicago.

Vice-President, P. C. Jacobs, Johns-Manville Co., Chicago.

Secretary-Treasurer, C. W. Kelly, Kelly-Derby Co., Chicago.

Directors for three years, T. W. Aishton, National Malleable Casting Co., Chicago; A. P. Van Schaick, Lackawanna Steel Co., Chicago.

Director for two years, L. W. Shugg, General Electric Co., Schenectady, N. Y.

On motion of N. M. Hench (Carnegie Steel Company), the board of directors was instructed to ascertain before January 1, 1919, the sense of the members of the association as to whether an exhibit should be held next year. It was felt that in view of present conditions unexpected changes might occur during the year. The board of directors retains authority to actually decide the matter.

A. R. E. A. Registration

Abbott, F. E., Insp. Eng., Lackawanna Steel Co., Buffalo, N. Y.
Albright, C. C., Asso. Prof. C. E. Purdee Univ., Lafayette, Ind.
Angerer, Victor, President, Wm. Wharton Jr. & Co., Inc., Easton, Pa.
Angier, F. J., Supt. Tim. Pres., B. & O. R. R., Baltimore.
Anthony, F. D., Const. Eng., D. & H. Co., Albany, N. Y.
Armour, Robert, Masonry Eng., Grand Trunk Ry., Montreal, Can.
Armstrong, H. J., Asso. Prof. C. E., Armour Inst., Chicago, Ill.
Bailey, A. R., Asst. Prof., Univ. of Mich., Ann Arbor, Mich.
Baisinger, W. C., Office Engineer, Santa Fe Railway, Chicago, Ill.
Baldridge, C. W., Asst. Eng., A. T. & S. F. Ry., Chicago.
Baldwin, A. S. (Past-President), Chief Engineer I. C. R. R., Chicago, Ill.
Baldwin, Hadley, Asst. Ch. Eng., C. C. C. & St. L. Ry., Cincinnati, O.
Baldwin, Springfield, Val. Eng., Trinity & Brazos Valley Ry., Teague, Texas.
Balliet, H. S., Assistant Terminal Manager, Gr. Cen. Ter., and Sig. Eng., N. Y. C. R. R., New York.
Baluss, F. C., Eng. B. and B., D. M. & N. Ry, Duluth, Minn.
Bardwell, R. C., Asst. Engineer, M. P. R. R., St. Louis, Mo.
Barnes, W. C., Asst. Con. Eng., Sou. Pac. Co., New York.
Bayer, E. J., Asst. Eng., Big Four Ry., Galion, Ohio.
Beckett, F. T., Eng. M. of W., C. R. I. & P. Ry., El Reno, Okla.
Beugler, Edwin J., Con. Eng., Westinghouse, Church, Kerr & Co., New York.
Blaiklock, M. S., Eng. M. of W., Grand Trunk Ry., Montreal, Canada.
Bloecher, Theo., Jr., Div. Eng., B. & O. R. R., Philadelphia, Pa.
Blum, Bernard, Div. Eng., Nor. Pac. Ry., St. Paul, Minn.
Boardman, H. E., Asst. Eng., Val. Dept., N. Y. C. Lines, New York, N. Y.
Boots, E. W., Asst. Eng., P. & L. E. R. R., Pittsburgh, Pa.
Bowser, E. H., Supt, Timber Dept., I. C. R. R., Memphis, Tenn.
Boyd, James, Div. Eng., G. T. Ry., Hamilton, Ont., Canada.
Bragg, R. R., Div. Eng., C. R. I. & P. Ry., Eldon, Mo.
Bremner, Geo. H. (Treasurer), District Engineer, Bureau of Valuation, Interstate Commerce Commission, Chicago.
Bridgman, J. N., Asst. Prof., C. S., Univ. of Nebraska, Lincoln, Neb.
Briggs, Z. M., Asst. Eng., Penn. Lines, Pittsburgh, Pa.
Brown, H. C., Jr., 37 West Van Buren St., Chicago.
Brown, J. M., Rock Island Lines, Eng. Dept., Chicago, Ill.
Brown, R. K., Eng. Maint., L. A. & S. L. R. R., Los Angeles, Cal.
Browne, H. L., Asst. Eng., Rock Island Lines, Cedar Rapids, Ia.
Brumley, D. J., Valuation Engineer, I. C. R. R., Chicago, Ill.
Budd, Ralph, Exec. Vice-Prest., Great Nor. Ry., St. Paul, Minn.
Buehler, Walter, Con. Eng. Wood Pres., Barrett Co., Chicago, Ill.
Burns, J. F., Asst. Eng. M. W., L. & N. R. R., Louisville, Ky.
Burpee, Moses, Ch. Eng., B. & A. R. R., Houlton, Me.
Burrell, Chas. F., Eng. M. of Way, K. & I. T. R. R, Louisville, Ky
Burt, A. M., Chief Eng. M. W., N. P. Ry., St. Paul, Minn.
Burton, W. J., Asst. Eng., Mo. Pac. R. R., St. Louis, Mo
Campbell, J. L., E. M. W., E. P. S. W. Ry. System, El Paso, Tex.
Chenworth, C. J., Asst. to Third V.-P., A. C. L., Wilmington, N. C.
Christian, W. A., Senior Civil Engineer in charge of Track and Roadway, I. C. C., Chicago, Ill.
Christofferson, C. A., Signal Eng., N. P. Ry., St. Paul, Minn.
Church, S. R., Man. Research Dept., The Barrett Co., New York City.
Churchill, Chas. S. (Past-President), Asst. to Pres., Norfolk & Western Ry., Roanoke, Va.
Clark, W. A., Chief Engineer, D. & I. R. R. R., Duluth, Minn.
Clements, M. F., Bridge Eng., Nor. Pac. Ry., St. Paul, Minn.
Cleveland, G. C., Chief Eng., N. Y. C. R. R., West of Buffalo, Cleveland, O.
Condron, T. L., Consulting Engineer, Monadnock Block, Chicago.
Coon, C. J., Eng., Gr. Cen. Term, N. Y. C. R. R., New York.
Courtenay, W. H. (Director), Chief Engineer L. & N. R. R., Louisville, Ky.
Cox, J. B., Consulting Engineer, Chicago, Ill.
Crane, E. B., Asst. Eng., C. M. & St. P. Ry., Chicago.
Crumpton, Arthur, Asst. Val. Eng., G. T. Ry., Montreal, Can.
Curd, W. C., Layne-Bowler Co., Memphis, Tenn.
Curtis, L. G., Dist. Eng., B. & O. C. Ter. R. R., Chicago, Ill.
Cushing, W. C. (Past-President), Ch. Eng. M. of W., S. W. Sys., Penna. Lines, Pittsburgh, Pa.
Cutler, A. S., Asst. Prof. Ry. Eng., Univ. of Minn., Minneapolis, Minn.
Dansey, J. W., Asst. Eng., A. T. & S. F. Ry., Chicago, Ill.
Darden, W. L., Consulting Engineer, St. Paul, Minn.

Darling, F. S., Boston, Mass.
Davis, A. L., Office Eng., I. C. R. R., Chicago, Ill.
Davis, Garrett, Val. Dept., Rock Island Lines, Kansas City, Mo.
Dawley, W. S., 5657 Cabanne Ave., St. Louis, Mo.
Dayton, C. A., Asst. Eng., D. L. & W. R. R., Binghamton, N. Y.
Deimling, J. F., Acting Ch. Eng., M. C. R. R., Detroit, Mich.
Denney, C. E., Asst. to Prest., N. Y. C. & St. L. R. R., Cleveland, Ohio.
Dewees, A. R., Div. Eng., P. M. R. R., Saginaw Mich.
Dick, H. B., Dist. Val. Eng., B. & O. R. R., Cincinnati, Ohio.
Dodgson, F. L., Con. Eng., Gen. Ry. Sig. Co., Rochester, N. Y.
Dorley, A F., Eng. M. W., East. Lines, M. P. R. R., St. Louis, Mo.
Douglas, H. T., Jr., Chief Eng., C. & A. R. R., Chicago.
Downs, L. A. (Director), Gen. Supt., Ill. Cen. R. R., Chicago, Ill.
Dufour, F. O., Structural Eng., Stone & Webster Eng. Corp., Boston.
Duncan, K. B., Val. Eng., A. T. & S. F. Ry., Topeka, Kan.
Edgerton, H. H., Asst. Eng., C. G. W. R. R., Chicago, Ill.
Edmondson, G. N., Div. Eng., N. Y. C. R. R., Rochester, N. Y.
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Railway Night at the Western Society of Engineers

Three Discussions of the Material Situation and an Account of Labor Conditions in the Orient

"RAILWAY NIGHT" at the rooms of the Western Society of Engineers was a decided success. About 200 members and guests were present, among whom were included a considerable number of the members of the American Railway Engineering Association. Three general classes of materials were covered, namely, steel, timber and concrete, separate talks being given by representatives from each industry. Following these addresses a paper was presented by Frank Rhea on the labor situation in the Orient.

The Structural Steel Industry

F. J. Llewellyn, Division contracting manager, American Bridge Company, Chicago, presented the situation in the steel industry. He stated that the problem of the war was to turn gold into steel. The steel productive capacity of the world at the present time is 100,000,000 tons per annum, of which one-half is produced in the United States. Of this total 16,000,000 tons capacity has been added since the war began. Because of unfavorable weather early this year, about 10 per cent of this year's output has been lost, but conditions are improving and the mills are now approaching capacity production.

The car shortage has been the most serious obstacle encountered. The labor shortage has also interfered, but has not been at all serious. However, with the drain to result from the new draft requirements it is impossible to say what the condition will be later on in the year. In anticipation of this drain, boys of 17 and 18 are being trained to take the places of men. The speaker pointed out that the steel industry could claim no exemption on men except in cases where the work on which they were engaged held an A-1 priority order.

It is the opinion of the speaker that 50,000,000 tons of steel is more than can be made use of by manufacturers of this country, so there should be sufficient available to supply all reasonable needs. He believed that the fabricating shops of the middle west could readily take care of 100,000 to 150,000 tons of work in bridges and buildings this season. In conclusion he stated that the catching up process was now under way, but pointed out that the first consideration in any case was the supplying of any requirements that would help to win the war.

Timber Situation Improving

The conditions in the lumber market were presented by Herman Von Schrenk, consulting timber engineer, St. Louis, Mo., who expressed pleasure at being able to present a much more optimistic message last night than would have been possible two weeks ago. The situation has been gradually improving since the first serious congestion following the large orders placed by the Government when war was declared.

The industry has suffered from three principal obstacles, car supply, labor shortage and determination of priority. The supply of lumber in the country is enormous, and the fears for a lumber famine repeatedly expressed 10 to 15 years ago have been discredited. The supply of southern pine is estimated at 350 billion ft. b. m., while the amount of uncut timber on the west coast is much greater.

In both the southern and the western fields there was a sharp congestion following the placing of the first government orders, but the rate of production was increased rapidly and 750,000,000 ft. b. m. of southern pine was supplied in the first nine months of the war. The demand resulted in embargoes of two kinds—restrictions as to sizes and curtailing of shipments for domestic use. In the South, the lumbermen were not allowed to dispose of any timbers 12 in. by 12 in. or larger. In the West the restriction covered any piece 12 in. on any face. The southern pine restrictions have been modified somewhat and the condition has been improved also by the use of laminated timbers.

The supply of the smaller sizes of lumber is ample, partly through their incidental production in the manufacture of larger sticks, and partly through a curtailing of the private building operations since the opening of the war. The hardwood industry has been more largely restricted and the market is in what may be termed a "receptive attitude."

Conditions in the Cement Industry

By B. F. Affleck

President Portland Cement Association, Chicago.

The cement plants of the United States have a capacity of about 120,000,000 bbls. of Portland cement annually. The maximum year's consumption, (in 1916) was 94,552,296 barrels. Under ordinary conditions all of the producing capacity can probably never be employed in any one year because at no time is it likely that normal conditions as affecting production, labor and the use of cement will prevail throughout the entire country.

From the foregoing statement it will readily be seen that the engineer in charge of railroad or other construction will have no difficulty in obtaining all of the Portland cement he may need provided cement makers are able to obtain material, labor, fuel, transportation and the numerous other smaller but none the less essential supplies.

Although the Portland Cement Association carefully refrains from any activities relating to prices or commercial transactions, I think I may with propriety say that the cost of making cement has been rising steadily at all or nearly all plants for many months. Wage rates have increased very substantially and, as is often the case, labor efficiency has diminished and the cost of fuel, explosives, material, repair parts, in fact everything entering into the production of cement has advanced so that while cement prices are now about as high as, or higher

than for some 12 or 15 years, the net return to most companies is quite meagre, and is likely to be, unless prices are advanced. Another cause contributing largely to this result is the fact that production and shipments at most plants are very much below normal, the statistics showing shipments from all plants in the United States for January and February to have been 31 per cent less this year than last. Production is curtailed because of inability to obtain material, fuel and labor, and shipments are curtailed by reason of inability to obtain cars. There is apparently a desire on the part of the cement user to use a normal quantity of cement but this desire does not materialize into actual demand for various reasons.

Of these reasons the railroad officer is chiefly concerned with those having a relation to railroad facilities and I give it as my judgment that most of our troubles are traceable to inadequacy of these facilities or, to state it more accurately, a sudden overloading of our transportation system. The railroads should not be blamed for this condition any more than we should blame a bushel basket because it will not hold a bushel and a half.

In the admirable article by Samuel O. Dunn, editor of the *Railway Age,* in Colliers' of March 9, he compares the two five-year periods ending with 1906 and 1916 and quotes James J. Hill, who in 1907 said that during the following five years there should be invested in railroad facilities, $5,500,000,000 instead of which only $4,500,000,000 was invested during the following nine years. On the basis of that reasoning the railroads are now about five years behind the country. He states further that until Government control was adopted, Government regulation compelled competition, thereby making it impossible to use existing facilities to the best advantage. This is not said in criticism of the railroads. They have, for the most part, undoubtedly been managed well and efficiently and had Government authority recognized their needs and permitted them to earn adequate revenue, there can be no doubt that large quantities of stocks and bonds would have been sold and the proceeds put into equipment, improvements, extensions and enlargement of facilities, and at a time when labor and material were both comparatively cheap and plentiful.

Cement, unlike other materials of construction cannot be used alone. For every ton of cement the builder must have from four to eight tons of sand, stone, pebbles, slag or brick, and while I can assure you that the cement makers can furnish all the cement you may need, provided cars, labor and materials are obtainable, it will do you no good unless the other materials are also available, and they are to a great extent dependent also on these same factors—cars, labor and material.

I will take advantage of this opportunity to say a word concerning the use of cement in bulk instead of in packages. It has been demonstrated conclusively on many works of various kinds that cement can be received and handled in bulk as readily as in packages, and in many instances with a considerable economy. The cement maker offers cement in bulk at a lower price than in packages, the difference representing substantially the saving to him in labor. There is another reason, however, why the cement user should receive cement in bulk if he possibly can. Cotton is about three times as high in price today as normally. The demands of our Government and the Allies are very large and the material is scarce. It will readily be seen that to wear out cotton cement sacks unnecessarily is not only an economic waste which should be prevented, but it tends further to advance the price of everything else made of cotton, thereby increasing the cost of conducting the war.

As far as railroad construction is concerned, I believe it goes without saying that the Government now realizes so completely the necessities of the railroads that there will be a classification which will give this particular work a place very close to the head of the list. I need scarcely say that those in authority at Washington having complete responsibility for the railroads during the war desire their capacity increased and operation to be at maximum efficiency. This result cannot be accomplished without a great deal of new construction for which, if it is authorized, the Government will certainly arrange for necessary materials.

May I mention briefly two other means of transportation—highways and waterways. A very large percentage of the freight handled by rail has its initial or final movement, or both, over the highways. Practically all food and package freight belongs in this class. It seems to me the railroads should encourage the construction of good roads in every way possible. They supplement rather than compete with rail transportation. It is true that trucks are now handling much freight which under normal conditions would move by rail but this is for the most part short haul traffic which is unprofitable to the rail lines and on which they cannot, even in normal times, furnish as rapid service as the truck which can handle direct from store door to store door.

As to the waterways, it is doubtful if we can afford at this time to spend much money or effort in connection with the inland, artificial waterway of shallow draft. The results would be too small and the time consumed too long. The limitations of such waterways greatly reduces their value in relation to their cost. They serve only those immediately adjacent to them, others being under the necessity of getting their freight to and from the water's edge with rehandling often at both ends. The railroad has not that limitation.

Concerning the natural deep waterways, requiring a relatively small expenditure to make them available, while laws were passed divorcing steamship lines from railroad ownership or control, it is to be hoped that under Government operations such arrangements will be resumed as will enable the railroads to use steamboat connections to the best possible advantage.

This will, of course, necessitate the construction of ships, barges, and lighters for lake and harbor navigation. For this purpose, if it appears that there will not be an adequate supply of material or labor to build ships of steel or wood, it may be that relief may be had by turning to concrete. While the term concrete ship suggests cement this is something of a misnomer. The percentage of reinforcing steel in a concrete ship's hull is so large that I am told the actual cost of the steel bars in a concrete ship is about 12 times the cost of the cement. The largest vessel ever built of concrete and the only ocean-going concrete ship ever built in this country was launched at San Francisco last Thursday. The Portland Cement Association received by special messenger this morning a moving picture of the launching, which I believe you will be interested in seeing.

This ship was built by the San Francisco Shipbuilding Co. from designs by McDonald & Kahn of San Francisco. It is 336 ft. long, 44½ wide and 30 ft. deep. It was christened "Faith" and has a dead weight capacity of 5,000 tons. Immediately after launching, she was towed to the Union Iron Works for installation of engines, boilers and machinery and by June 1 will have made her trial trip.

In conclusion let me repeat the cement industry stands ready to meet any demands the railroads or the Government may make of it, subject only to its ability to obtain coal, material, supplies, transportation and labor.

Labor Conditions in Japan and China

By Frank Rhea

United States Department of Commerce, Washington, D. C.

I have been asked to talk about the labor and economic conditions prevailing at present in China and Japan. I can only give you the benefit of my observations gathered in a period of seven months. There are two conditions which have been generally supposed to exist both in China and Japan, namely, that there are no limits to the amount of labor and time available for doing anything. This is still true in China, but the results of the war have changed the situation very materially in Japan, and I am satisfied that it is a fact that today there is a shortage of labor in almost every line of industry in Japan. It is possiible that this is not as acute now as during the time when I was in Japan last year. The reason, if so, is on account of Japan not being able to obtain the necessary supplies of steel.

The purpose of my investigation was to ascertain the possible markets for railway materials, equipment and supplies, such as could be furnished by American manufacturers. My reports on Australia and China are taking somewhat of the form of reference reports and as a matter of fact my investigation was really one more of materials than of labor and economic conditions. However, after going over the matter in a preliminary way, in each country, I concluded that in order to report intelligently on the possibilities of the markets, it was necessary to study the labor conditions, the supplies of raw materials and the iron and fuel resources of the countries. Today the supply of steel is the problem which concerns Japan more than any one question, and they are thoroughly aroused to the necessity of securing an adequate supply from the standpoint of defense. This desire and also to supplement their present inadequate supply of fuel explains many features of the so-called Japanese aggression. It is true, however, that the Japanese show more capacity for organization and administration than any other division of the yellow race. They are also seeking permanent markets for their home factories and look to China as their natural markets. At the present time, however, the coal production is being restricted on account of the shortage of labor. An estimate was made to me that this shortage of labor amounts to as much as 25 per cent of the labor which could actually be utilized.

Wages in the industrial districts have increased very substantially.

There is some discussion going on in Japan today regarding the lifting of the restrictions on the bringing in of other labor, particularly from China and Korea. Early in July, the Imperial Government Railways brought from the Korean railways some 400 Korean coolies experienced in track work, but only one attempt was made, for the reason that there was a universal protest from all classes of labor in the Moji industrial district, the point where these Korean coolies were landed and worked.

The labor situation in China has been affected little by the war except in the particularly limited localities. The railways of China are located principally north of the Yangste river, and I spent a greater part of my time in this part of China. The northern Chinaman is much more robust than some of the central and southern Chinese. The Shantung man, who is probably the best laborer in China, is usually a well-built upstanding, muscular man, with very little surplus weight. It is not generally known that the British have recruited up to date about 150,000 Shantung coolies, who have been sent to France, generally by way of the Canadian Pacific Railway.

One interesting situation in connection with the Japanese deevlopment in Manchuria is the fact that annually there is a migration of 250,000 of these robust Shantung coolies across the Bay of Chihli. These men usually embark at Weiheiweih and Chefoo to Dairen and Newchang, and the Japanese are thus able to select the best of these men for the operation of the shipyards and shops at Dairen and the Fushun and Penchihu collieries. The Japanese have also been using this class of labor for the railway building and railway reconstruction and their other various enterprises in South Manchuria. The other Chinamen, such as the Chihli, Shansi and Honan, are all well built, upstanding men. The labor in the province of Hupih, where the Han-Yeh-Ping Iron Works are located, are much less robust than the above described men. This is particularly noticeable in the steel plant, where the men prove incapable of withstanding the hard work around the rolling mills satisfactorily, although it is surprising to see the work they do in such items as carrying coal, ore and coke, all of which is done at this plant by hand. The Cantonese Chinese is probably the frailest of the Chinese. This is to be expected, as Canton is practically the same latitude of Havana, Cuba, Haupow being almost exactly the latitude of New Orleans. Therefore, while there is a large quantity of labor in some parts of China, its quality is certainly very inferior, the two last named places being examples of the least capable and the first named the most robust, with probably all varying degrees between them. The labor of the province in which Shanghai is located is fairly robust and the labor along the China coast to Hongkong is fairly robust. The methods of labor on both the Japanese and Chinese railways were very interesting, although I was not as favorably impressed with the capacity of the Japanese track labor as I was with the Chinese. Possibly I was prejudiced in this, but undoubtedly the labor situation in Japan is becoming troublesome, and I was able to notice the results of this in connection with track labor. Notwithstanding the fact that I, of course, made no success of learning to speak the Japanese language, earmarks of labor unrest seemed to me to be noticeable. In addition, while the Japanese are capable workmen, when they so incline, they are, however, inclined to be more troublesome and are not of the natural good nature of the Chinese coolie.

There is one rather interesting fact, however, and that is that neither the Chinese coolie nor the Japanese coolie can be successfully driven. They are both inclined to take their time. The wages on the Chinese railways are rather variable. On the Shanghai-Nanking I was able to get very definite information. Here a section foreman in charge of three gangs over a territory of 15 miles is paid from $25 to $30 silver money, or, as it usually termed, "Mex." Foremen of gangs, or, as they are called, "gangers," are paid from Mex. $15 to $20 per month. Gangs are organized with two leading coolies, and these are paid Mex. $10.50; ordinary coolies are paid Mex. $8 per month, and each gang is furnished with a cook, who is paid Mex. $5. Crossing watchmen are paid Mex. $6.50. These wages are paid to really capable and experienced men, and, as I have seen on a number of occasions, doing real railway sectionmen's

work. The wages on the other railways are comparable to the above for the reason that the Shanghai-Nanking Railway is in a territory where there has been considerable industrial development around Shanghai and Woosung and Soochow. In the workshop at Tongshan the wages paid for common coolie labor is Mex. $.30. This is for ordinary labor around the shops. The shop mechanics are paid wages varying from Mex. $.60 to $1.30, the latter applying to the most experienced boilermakers.

One of the most interesting situations is the Japanese development in Southern Manchuria, particularly the Shakaho workshops at Darien. There are about 4,150 men in these shops, of which 72 per cent are Chinese. All executive, administrative and technical and such positions as cranemen, engineers, etc., are filled with Japanese. Chinese labor is depended upon entirely for the doing of all work, including such skilled occupations as molders. The Chinese are particularly good foundry workmen and he is one of the best masons in the world today. Regarding the question of business to be secured, there is no doubt in my mind that there will be a great deal of business done in this part of the world in the next 25 years, but there is one point which I would like to emphasize particularly, and that is that I do not agree with the ideas of some people which now prevail that this business can be secured practically for the asking. Instead of that, the business to be secured will take close attention and there will have to be a thorough study made of the conditions to be met. I made some analysis of the investment assets as shown on the balance sheets, a study of the fixed obligation, and the Chinese railways to-day are profitable and in my opinion will be increasingly so. Furthermore, there is need for a considerable amount of additional railway mileage and if built will prove profitable. I am also of the opinion that the American manufacturers should combine in their efforts for securing this business instead of competing against each other as has been the practice in the past. I was very much impressed with the thorough study which the British are giving post-war trade conditions. In every instance the British houses are carefully studying the matter of holding their own organizations together to be in position to resume business promptly at the termination of the war. In addition, the British government has representatives on the ground carefully studying and reporting on all the fundamental conditions.

New Signaling on Grand Trunk

The Grand Trunk is just completing a section of automatic signals between Shelburne, Me., and Bethel. This stretch covers 22 miles of single track and consists of the A. P. B. signaling. A contract has been awarded to the General Railway Signal Company for the necessary material to signal 16½ miles of single track between Bethel, Me., and West Paris. This work is to be a continuation of the first section and will be installed by railway company forces.

The A. R. E. A. Service Flag

One of the impressive features of yesterday morning's session was the unfurling of the service flag of the American Railway Engineering Association containing the figures "103," to commemorate the part which members of this Association are taking in the service of their country. Aside from this personal service on the part of the 103 members, service pins are on the coat lapels of not a few of the older members who have come to the convention. Secretary Fritch is one of the wearers of such a pin, having a son in the artillery service.

Cuts and Fills

Opportunity Missed

An El Paso man tells of one Westerner's opinion of Chicago. It appears that this man had occasion to visit the city, which he had never seen before. He remained for a week or two longer than he had expected, and, in writing of his experiences to his wife in the West, he said:

"Chicago is a great city, but I do wish I had come here before I was converted."

No Chance to Sue

The following is the official report furnished by a station master of the Shanghai-Nanking railroad, in China, of an accident which occurred October 8:

1. The death named—was smashed by the engine on 3-10-07.
2. Has two sons—and—
3. The death without ticket.
4. The death's fault.
5. The death no relative see.
6. The death is deaf and blind no cannot say what was.

Dangerous Illness

An old negro, riding on the train, fell asleep with his mouth wide open. A mischievous drummer came along and, having a convenient capsule of quinine in his pocket, uncorked it and sifted the bitter dose well into the old negro's mouth at the root of his tongue. Soon the darky awoke and became much disturbed. He called for the conductor, and asked:

"Boss, is dere a doctor on dis here train?"

"I don't know," said the conductor. "Are you sick?"

"Yas, suh, I sho' is sick."

"What is the matter with you?"

"I dunno, suh, but it tastes like I busted my gall."

Oh, Well! I'll Try It Tomorrow

A traveler in Ireland relates the following conversation with an innkeeper:

"At Brodigan's all the clocks are from ten to twenty minutes fast or slow.

" 'How do you catch trains?' I asked Mr. Brodigan.

" 'Sure, that's not an every-day matter, and why be foosthering over it? But we do four times out of five, ma'am.'

" 'How do you like it the fifth time when you miss it?'

" 'Sure, it's no more trouble to miss the wan time than to hurry five times. A clock is an overrated piece of furniture to my mind.' "

On a Narrow Margin

A committee member, after attending a meeting last night and conversing for some time in the hotel lobby, entered the grill at a late hour. He glanced at the clock, then at the calendar, then at the menu, from which he ordered a frugal repast. Then he waited, nervously.

At the end of ten minutes, he succeeded in catching his waiter's eye.

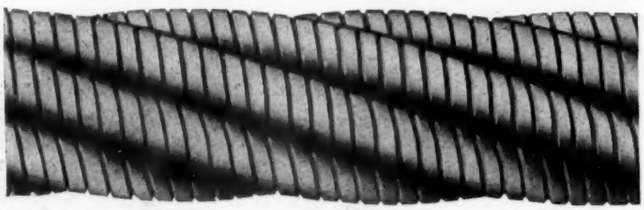
"Look here, how long am I going to have to wait for that grub I ordered?" he inquired.

"Oh, I guess it won't be long, now," yawned the waiter. "In a hurry?"

"In a hurry? Say, I ordered a meal without meat because it is meatless day. And if I have to wait five minutes longer it will be wheatless day, and I won't get a darned thing!"

An Improved Design of Armored Rope

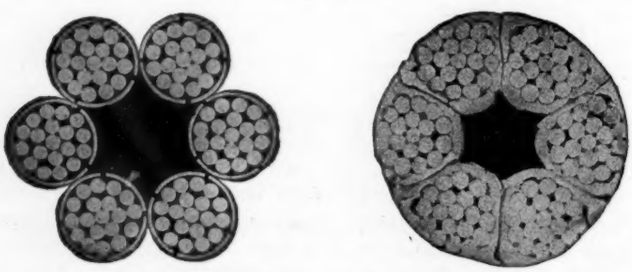
A ROPE FOR USE on hoisting, haulage, dredging and steam shovel equipment which involves radical and important departures in wire rope construction is being manufactured by the Waterbury Company of New York. The rope is known as armored rope, Gore patent, and is comprised of six strands and either 19, 37 or 61 wires to the strand, as conditions may demand. Its feature of construction is that each strand is covered or wound with flat wires having convex edges which



A Section of Waterbury Armored Rope

form a protection armor, relieving the wires carrying tensile stresses of all abrasive wear and thus retaining the strength of the rope, even after the flat wires are worn completely through. These flat wires are specially drawn and annealed and for that reason they do not project and break off when worn through, but are gradually crowded into the interstices of the rope, thus adding to the wearing surface and hermetically sealing the lubrication within.

By reason of the armor protection at the crowns of the strands and the internal points of wear where the



Cross Sections of the Rope

wires and strands converge, and chafe during flexing movements it is possible to select for the wires in tension those which show a high torsion test. This, together with the internal lubrication, insures flexibility and a long bending life.

It is also claimed for the rope that, because the tensile strength wires are relieved from abrasion, the factor of safety is maintained longer than in rope of other construction. In addition to the added life of the rope itself, it is economical in that the rope wears with use to a smooth, round surface and does not affect the score of the sheaves and drums.

Service Life of Manganese Frogs and Crossings

SOME VERY INTERESTING DATA relative to the life and the economy derived from the use of solid manganese construction in frogs and crossings have been compiled by the Indianapolis Switch and Frog Company, Springfield, O. During the last 10 years more than $1,000,000 worth of manganese construction has been installed on over 100 of the leading roads. The service records on these roads indicates that, on the average, the life of manganese frogs and crossings is about 4 times that of Bessemer and open hearth construction. In several instances manganese frogs have shown a life 20 times that of fabricated frogs used in the same location previously, notwithstanding increases in the traffic and the weight of rolling stock since the installation of the manganese.

At the present time the use of manganese construction is particularly advantageous for several reasons. Solid manganese construction is virtually confined to the patterns and integral or unit construction. Fabricated construction requires numerous sections of rail, fillers, bars, plates, bolts, special shapes and forgings which under present conditions are difficult to obtain and require considerable labor. The use of manganese reduces the renewals necessary with other construction.

The Indianapolis Frog & Switch Company's specialties are so designed that the rails, as they come from the mill, join to the manganese portion in self contained easer arms, forming a lap joint protecting the rail ends as well as the manganese from joint pounding.

Improved Concrete Mixing Equipment

CONCRETE MIXER plants mounted on railway flat cars have been in use so long for doing concrete work on railway structures that they possess little that is novel except when some new modification of design is introduced to secure special adaptation to a particular class of work. In the earlier designs, particularly those on track elevation work in Chicago and elsewhere, the problem was essentially simple, as practically all of the forms could be filled with concrete from a mixer car standing on a temporary track at the new grade by the use of a spout placed directly under the mixer outlet. With the introduction of the tower and spouting system of handling concrete, it was not long before steps were taken to apply this system to mixer plants on cars. Towers were added so that the concrete could be elevated to

A Counterweight Chute Suspended From the Tower Boom

a sufficient height to permit the spouting of the concrete at some distance to either side of the track upon which the mixer car was stationed. To permit ready moving of the mixer car, the towers were usually made either of a folding type or facilities were provided for the ready removal of the tower when it was necessary to transport the car to some other point.

A more recent development is the application of a special counter-weight chute supported from a boom and thereby giving a greater flexibility in distribution. This special chute consists of a structural steel truss of tri-

angular shape, supported from its apex by means of a rope tackle attached to a steel boom suspended from the side of the tower. This triangular truss carries a spout on its top chord extending from the apex down one side of the triangle, the weight of this spout and its contents being balanced by a concrete counter-weight suspended from the opposite end of the truss. The truss can be readily revolved in a horizontal plane about the point of suspension at the apex and as this is also the point where the concrete is received from the spout above, it is readily possible to turn the counter-weight spout in any direction without interfering in any way with the discharge of the concrete.

With concrete work close to the track or under other conditions in which it is more convenient to use the direct spout, the counter-weighted spout can be readily removed and can be as readily re-attached when work demands its use. This equipment is manufactured by the Insley Manufacturing Company, Indianapolis, Ind., and has been applied to concrete mixer equipment on the New York, Chicago & St Louis, the Delaware, Lackawanna & Western and several other railroads.

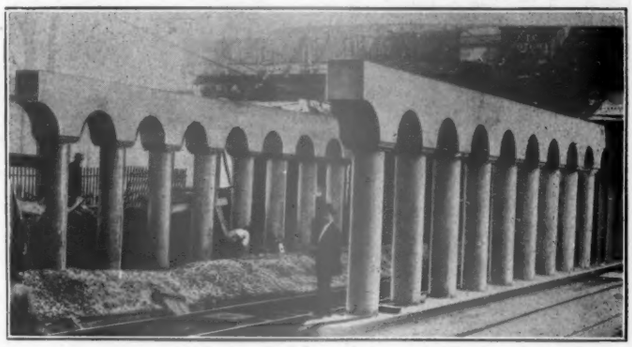
Re-Use of Forms Results in Important Economies

IN THE RECONSTRUCTION of the Illinois Central bridges over the track elevation subways within the city of Chicago, important savings both of materials and money are being effected by the use of "Blawforms." Under the construction plan adopted the railroad purchased all forms for use on this work, and the erection of the forms and the placing of concrete has been done by contractors. The furnishing of the forms by the railroad permitted their use by the different contractors

Forms Ready for Filling

engaged in the work, thus making it unnecessary for the individual contractors to invest heavily in equipment that after the completion of their portions of the work would be of no further use to them. It is possible for the railway to secure service from the forms after the completion of this particular project by adopting a similar design in future work. The construction was begun in the spring of 1915 and has been carried on continuously up to the present time. During this period the forms have been used by three different contractors, and on an average of about 20 times each. In spite of this heavy service the forms are still in good shape, and it is estimated that by the time the work is completed they will have been used 30 times each.

In 1915 the work consisted of the construction of six bridges, each of which contained three rows of columns and cross girders. Forms were furnished for two complete rows, 114 ft. wide. These bridges were built by the John J. O'Heron Company of Chicago. In 1916 Bates & Rogers, contractors, built two bridges, and in 1917 the Gould Construction Company built four bridges.



Completed Rows of Columns and Cross Girders

Each of the contractors utilized the forms furnished by the railroad. As the work progressed northward the width of the bridges was increased, and at Sixty-third St. the width is 160 ft. In some of the crossings four rows of columns and cross-girders were built, and on some only three. The contractor had at all times enough forms to set up two rows. The forms are coated with a light form of oil after each use and the work obtained is very satisfactory.

This project is being carried on under the direction of the bridge department of the Illinois Central, C. C. Westfall, bridge engineer. M. D. Thompson, assistant bridge engineer, is in direct charge of the work. The "Blawforms" are manufactured by the Blaw-Knox Company of Pittsburgh, Pa.

The Steel Fence Post as a Labor Saver

TIME, WEATHER and fire continue their unceasing attacks on right of way fence posts, notwithstanding the fact that the American railroads at the present time cannot find enough men to dig the holes necessary to replace the posts that are being destroyed. This is probably the most important reason why steel fence posts which can be driven with a maul in a few minutes' time are being used in large quantities by the railroads in current renewals as well as on new work. Records kept by the Madden Company, Chicago, go to show that under average conditions two men, one driving the posts and the other one holding them, can set about 320 posts, or sufficient for a mile of fence in one day.

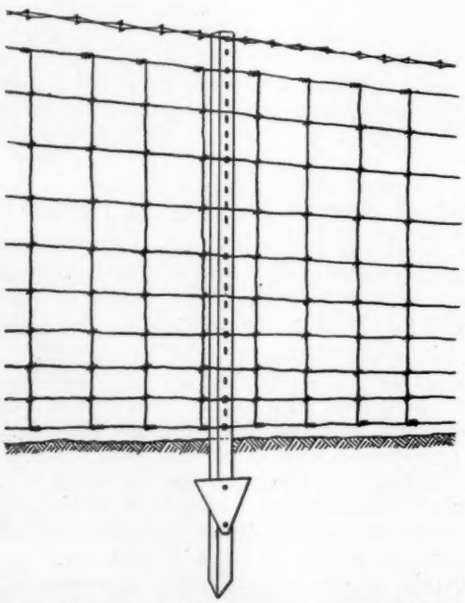
The details of this type of posts is shown in the accompanying drawing, and is seen to consist of an 1¼-in. by 1¼-in. structural steel angle to which a triangular plate is riveted to increase its resistance to overturning. The lower end of the angle is chamfered to facilitate driving. Holes in one leg of the angle, punched two inches center to center, afford a convenient means of fastening any type of fencing by means of staples, which are clinched with a special tool on the inside face of

the angle. These posts are considerably lighter than a standard wooden post, a fact which has been of no small advantage in shipping them during the current shortage of cars. This, in combination with their small

Steel Posts in Service 15 Years

cross section, enables a car which will hold 800 ordinary wooden posts to carry 5,200 of the steel posts.

Aside from the ready driving feature the users of these posts draw attention to the fact that grass fires on the right-of-way which destroy so many wooden posts before their natural service life has expired, do no damage to the metal posts. This fact has been found of particular advantage by the track men on those railroads in the west where it is the custom to burn the grass to a



Details of the Post and Fencing

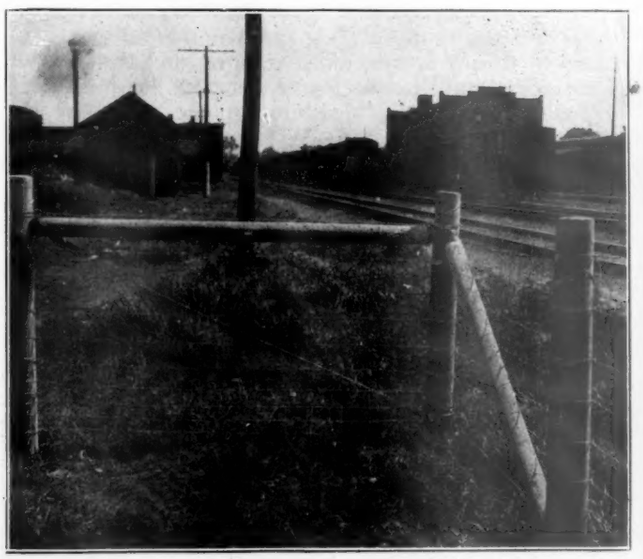
furrow plowed some distance outside of the right-of-way line. Where the steel posts are used there is no longer any need of detailing men to protect the fence posts as the fire burns across the right-of-way line.

The accompanying photograph illustrates the character of service that has been secured from steel posts along railway lines. The posts shown are on the right-of-way line of the Indiana Harbor Belt near Chicago, and have been in service since 1903. They are still in good condition. They are of practically the same design as those now being made, except that the plate is omitted from the base. These posts were treated with an asphalt paint, whereas the coating now applied is either a standard galvanizing or a rust inhibitive baked enamel.

An Improvement in Concrete Fence Posts

ONE OF THE MOST DIFFICULT problems to solve in concrete fence post construction has been the provision for the necessary additional strength at the ends and corners of the fences. For a long time the prevailing solution was the use of a timber stick for the brace post in connection with a concrete end or corner post that differed from the standard line post only in size. Various obstacles have made it difficult to produce a brace post in concrete possessing the same desirable qualities readily obtained in the standard post.

These difficulties seem to have been solved by the National Concrete Machinery Company, Madison, Wis., in a new design for the combination of an end or corner post with a brace post. A special feature of this combination is the use of castings on each end of the brace post having the form of short pins, which fit into corre-



The Corner Post and End Post Arrangement

sponding holes in the corner or end posts. Through this arrangement a secure connection is formed which is capable of resisting adequately any tension applied to the fencing material.

Another important feature of the design is that both the corner post and the brace post conform to the standard design followed in the line fence posts manufactured by the above company. The reinforcement consists of National woven steel wire as in the line posts, and the posts are cast in a cylindrical sheet steel mold, whereby it is possible to make use of the casting machinery in which the concrete is poured into the end of the mold while it is being jostled or worked rapidly up and down. This feature of the manufacture of these concrete posts has been instrumental in producing concrete of high compressive strength.

The corner post is 5 in. in diameter at the top and 7 in. in diameter at the bottom, and has a total length of 8 ft. The brace post has a uniform diameter of 4 in. and a length of 8 ft.

While the end or corner fence arrangement shown in the photograph is new, the novelty lies in the combination of the end and brace post rather than in the use of features that are entirely new. The end post in combination with another type of brace post has been in use for 8 years on the Cleveland, Cincinnati, Chicago & St. Louis, while the brace post with another type of end casting has been used in rural fencing for about 10 years.

The Trackless Train Saves Time, Men and Money

IN THIS DAY when labor is so scarce and operating costs are so high, railway officers are turning more and more to means of reducing handling costs and of saving time and labor as well. Never has the need of saving men been so apparent. Never have labor and money-saving devices been so much in demand, and of these the electric tractor for hauling is probably one of those most in demand because of the savings which have been effected with its use.

As a tangible example of a tractor's capability, attention is drawn to the Forty-third Street station of the Chicago Junction Railway. In this station approximately 1,800 tons of l. c. l. freight are handled daily. The installation of "The Trackless Train" system was brought about in this case, as in many others, by necessity. When this freight station was first opened hand trucking was entirely adequate to handle the business, but as the tonnage increased it was soon apparent that the cost of handling was becoming too high and congestion was occurring almost daily. The hand truckers were unable to keep the platforms clear and transfer the freight as fast as it came in. As a result of this condition, after careful consideration, electric trucking was installed with entirely satisfactory results.

Rounding a Curve with a Trackless Train

In installing the electric tractors, no changes were made to accommodate the new equipment. Operating arrangements were maintained exactly the same as when hand trucks were used. The hauls were the same; the floor and working conditions were the same, no sharp turns or corners were taken out; in a word, no effort was made to smooth the way for the tractors. Careful deduction and calculations show that even under prevailing labor and wage conditions, the saving effected by use of the tractors amounts to 4 cents per ton. Figuring on a total daily tonnage of 1,800 tons, the daily reduction cost is $72 and amounts in one year to $22,536.

The saving was brought about primarily by the fact that the use of the electric tractor reduced each gang of men from five and six to three and four. With the electric tractor in operation it became possible to make up trains of 3 to 12 or 14 loaded trailers. The installation of the tractor did not mean that the old trucking equipment was discarded. The old trucks were adapted to the new system by a few simple changes or additions and by the application of ingenious but simple hitches. They track perfectly, even around sharp right angle turns. The cost of the tractor was practically the entire cost of the "Trackless Train" installation, as the converting of the trucks and the addition of the hitches involved but minor expenditures.

The Tractor Hauling a Train of Loaded Trailers

The tractors used by the Chicago Junction are four Type Z machines, made by the Mercury Manufacturing Company, Chicago.

A New Form of Track Spike

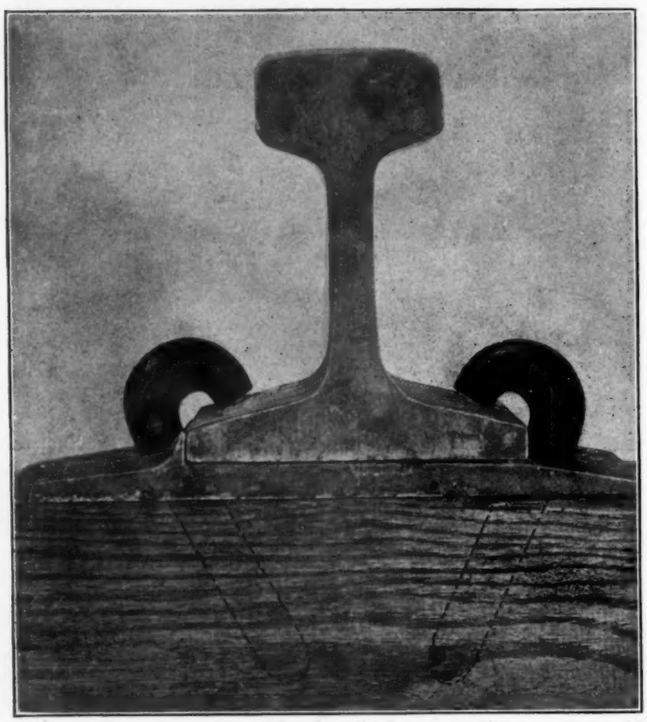
IN KEEPING ABREAST with the demands placed on it by an ever-increasing traffic and the use of heavier motive power and equipment, the design of the track as a structure has been constantly changed and improved. There is, however, one important unit in the structure which has not been subjected to the radical changes and improvements common to the remaining units. This is the track spike which, with the single exception of the screw spike, has remained practically unchanged in its fundamental design since its early use.

Recently a track spike has been developed and placed on the market by George A. Post of New York, which embodies radical changes both in design and in method of application. As may be seen in the photograph, this is a round, arch-head spike which is applied at an angle of 60-deg. from the horizontal. It is used with tie plates with diagonally disposed, tight-fitting holes, and when applied this combination effects a unit construction of the tie, tie plate and rail, which tends to prevent the creeping, spreading or canting of the rails. The diagonal in-

clination of the spike with reference to the wood fibers in the tie, together with the tight fit in the holes in the tie plate, prevents the spike from being withdrawn from the tie by the lifting action developed by the undulation of the rail under traffic.

Four spikes per tie are used except at rail joints. At joints the spikes are driven outside of the slots in the angle bars. The spikes may be driven either in holes bored in advance or in holes made when the rail is laid.

While the action of the rail under traffic will not loosen the spikes, they may be pulled with an ordinary claw-bar when ties are being renewed. In renewing rail it is not necessary to pull the spikes. Instead they are lifted slightly and given a quarter turn off the flange which permits the old rail to be removed and the new one set in.



The Arch-head Spike

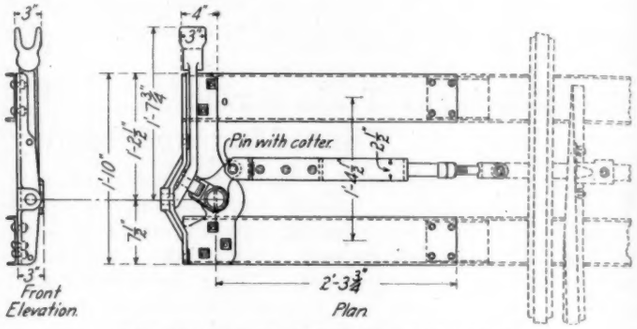
In addition to effecting a saving of labor this feature also conserves the tie as the creating of additional spike holes is avoided.

This spike has been tested out on two important eastern roads under conditions ranging from tangent track to a compound curve with a maximum of 6 deg. curvature in a track carrying traffic amounting to more than 100,000 tons per day and have shown highly satisfactory results.

A New Switch Stand For the U. S. Army

THE UNITED STATES ARMY has adopted a new switch stand for use with portable turnouts built of 25-lb. rail in track of 25⅝ inch gage. In addition to the use by the army this stand is of interest because of the difficulties encountered in working out the design. It was specified that the stand should not be over 3-in. high, that it should throw parallel to the track and that nothing should project below the level of the tie. This meant the exclusion of all existing types of switch stands and the development of a new and original stand.

By referring to the drawings it will be seen that the stand as built meets these specifications fully. In addition the stand has only three moving parts, the throwing lever, the crank lug and the sliding block. It can be disassembled instantly in the field without tools by simply removing the cotter pin. Another important feature of the stand is the absence of bolts, it being a boltless switch stand. The stand can be virtually renewed after becoming worn by hard service by removing the sliding block,



Plan and Front Elevation of the Stand

giving it a quarter turn, and replacing it. This brings two entirely new surfaces into play, and has the same effect as using a new part.

A spring connecting rod is used with the stand, making it automatic. The lever is on "dead center" when in normal position so that latches are not required. The stand can be locked if desired by utilizing the hole in the lever and the one in the upright flange of the base casting which registers when the lever is in either position.

This stand was designed and manufactured to the specifications of S. M. Felton, director general of military railways, by the Bethlehem Steel Company, Bethlehem, Pa.

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An Illustration of the Destruction Wrought by the Germans During Their Retreat on the Western Front